ROADMASTERS' CONVENTION NUMBER
OCTOBER, 1951

Railway Engineering and Maintenance

Rock Island Rockets to the Rockies

The Rockets are noted for their unparalleled accommodations traversing lands of superb scenic beauty over a roadbed maintained to the highest standards

these "maintenance men" know no quitting time

The Edgemark Of Quality

Reliance Hy-Crome Spring Washers on your track joint bolts function around the clock, around the year,—in traffic and out—instantly, automatically "taking up" looseness to extend the time between maintenance tightening.

The powerful coil-spring reactive force, developed through the use of special-analysis cold-drawn steel and scientific heat treatment used in their manufacture, keeps bolted assemblies *tighter longer* to keep the lines open for fast, smooth movement of the nation's peace and defense materials.

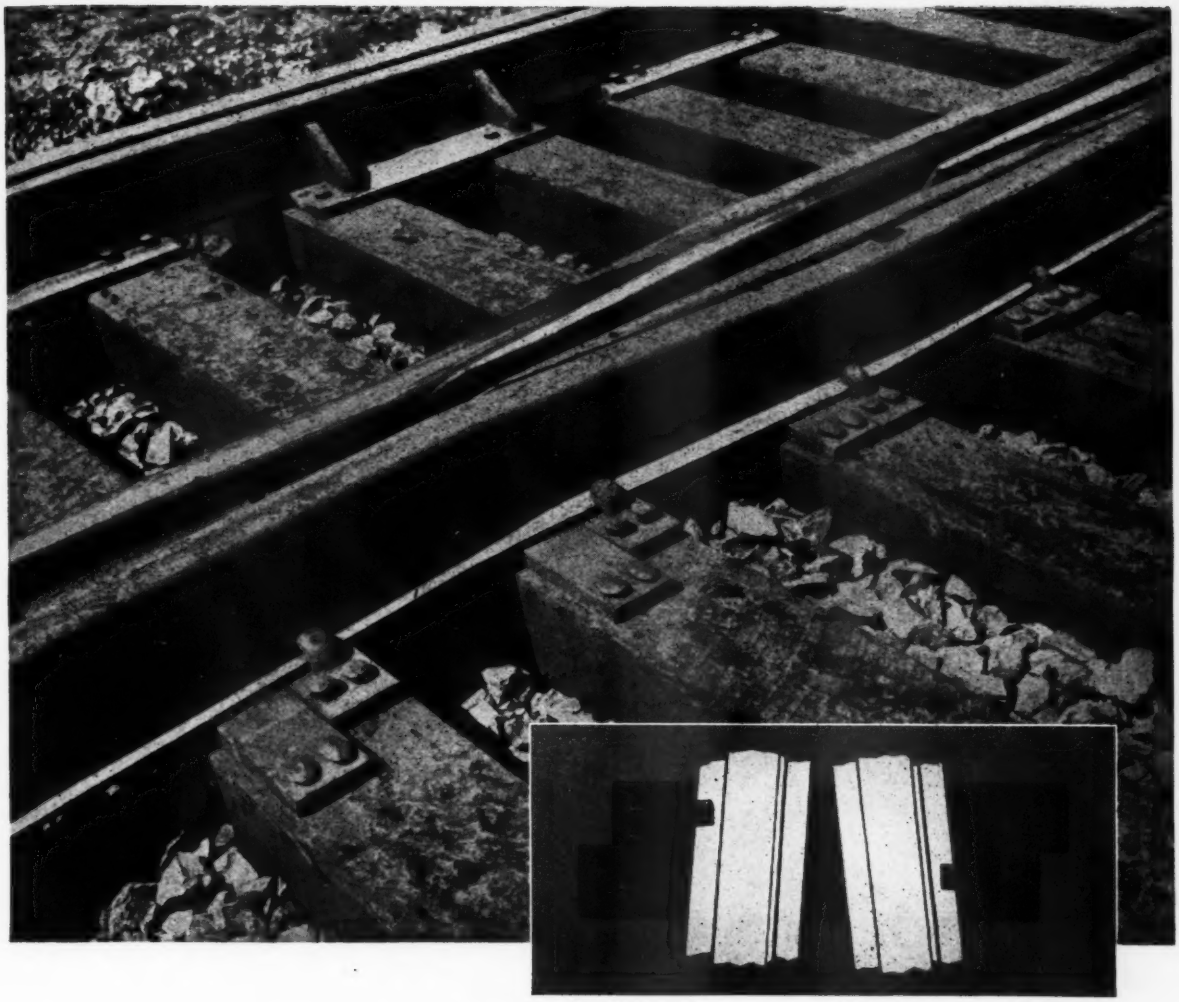
Whatever your track maintenance problems, there's a Reliance Hy-Crome Spring Washer to help you cut your maintenance costs. Call on a Reliance railroad sales engineer to help you select the right Hy-Crome Spring Washer for your application.

RELIANCE hy-crome SPRING WASHERS

EATON MANUFACTURING COMPANY, RELIANCE DIVISION

OFFICE AND PLANTS • MASSILLON, OHIO

SALES OFFICES: NEW YORK • CLEVELAND • DETROIT • CHICAGO • ST. LOUIS
SAN FRANCISCO • MONTREAL



They're the EASIEST Plates to Work With

You've probably seen track men fussing around with conventional frog plates, trying to keep tabs on all the different lengths for the various tie positions. Perhaps this has struck you as a great nuisance and time-waster.

It's the kind of thing you can eliminate by furnishing Bethlehem Twin Hook Frog Plates to track crews. These plates are used in mated pairs—never singly. Any matching pair fits several different tie positions, so that you don't need a large and confusing inventory of plates in many lengths. Study the pictures we show here. They tell you the story.

But there are other good features, too. Each plate has an integral forged hook, which is bigger and stronger than ordinary spike heads. Thrust and lifting don't bother these sturdy hooks. They can't loosen, rattle, jiggle.

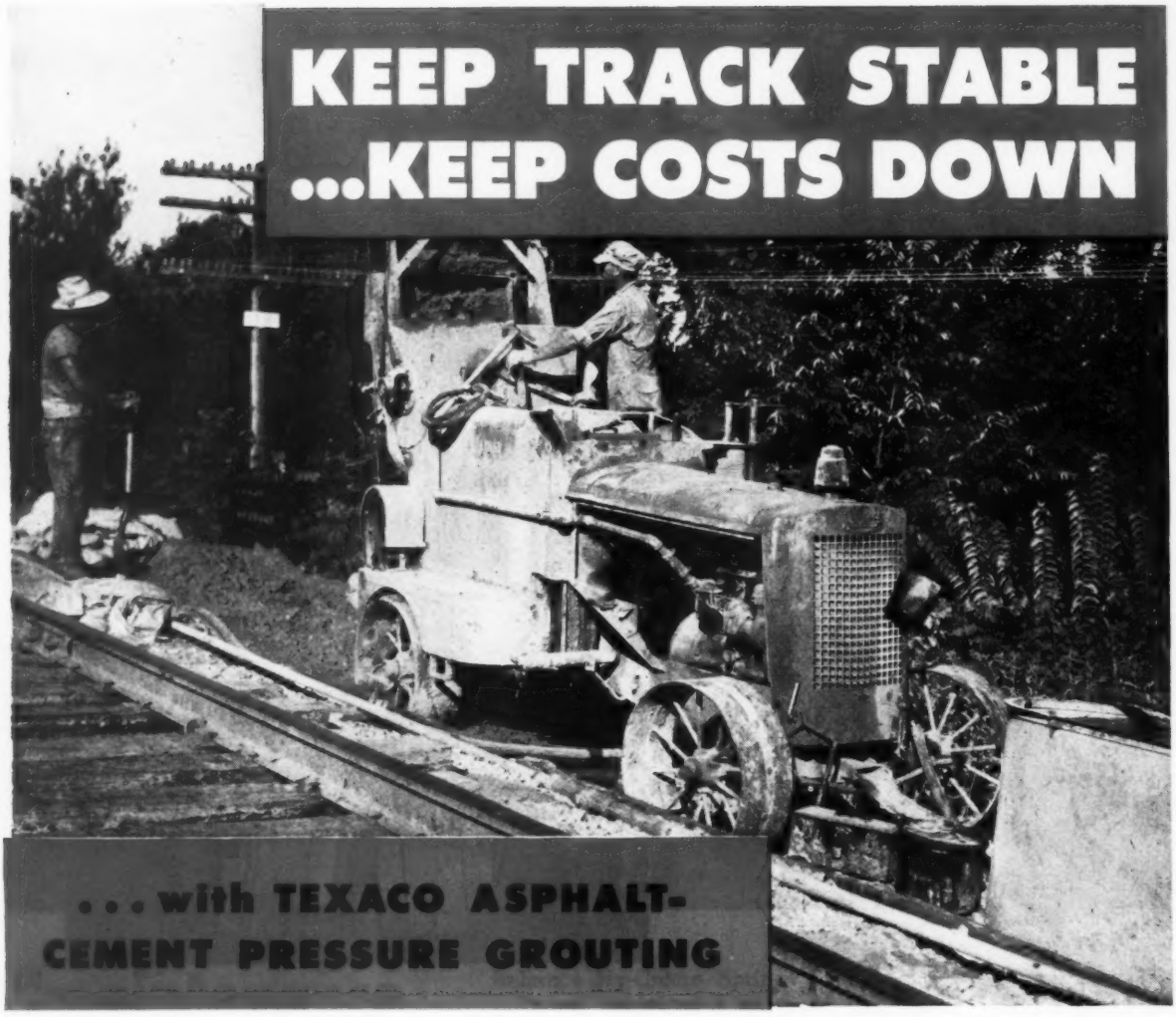
Standard Twin Hook Frog Plates are stocked in 23-, 27-, and 31-in. lengths; reverse-hook plates, for use at heel ends, are carried in the 27-in. length only. Ask a Bethlehem man for full information or request a copy of Folder 390.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Published monthly by Simmons-Boardman Publishing Corporation, 79 W. Monroe St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00 for one year; $3.00 for two years. Single copies 50 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Marion, Ind., post office. Address communications to 79 W. Monroe St., Chicago 3, Ill. Volume 47, No. 10.



You've read about—maybe you've already used—the pressure grouting method of stabilizing "soft track." It reduces maintenance man-hours, saves ballast, cuts down the amount of shimming necessary, and enables you to lift slow orders on many sections of track. All these benefits are yours by adding a small amount of *Texaco No. 24 Emulsified Asphalt* to the standard grouting mixture.

Texaco No. 24 Emulsified Asphalt is made especially to "lubricate" the grout, help it flow more smoothly, penetrate and seal better. In addition, *Texaco No. 24 Emulsified Asphalt* "waterproofs" the soil, keeps it stable yet resilient. Texaco Asphalt-Cement Pressure Grouting lasts indefinitely . . . saves many dollars on track maintenance.

Ask the Texaco man to give you full details about this cost-saving idea. Just call the nearest of the Railway Sales Offices listed below, or write:

The Texas Company, *Railway Sales Division*, 135 E. 42nd St., New York 17, N. Y.

NEW YORK ★ CHICAGO ★ SAN FRANCISCO ★ ST. PAUL ★ ST. LOUIS ★ ATLANTA

Texaco offers 2 other track maintenance cost-savers:

1. *Texaco Asphalt — For coating* ballast. Assures better drainage, and cleaner track. Tracks stay in line and on grade for years. Minimum attention . . . maximum savings.

2. *Texaco Rail Joint Lubrication* — Protects against frozen joints, kinking and corroding. Applied under traffic . . . lasts for years.

TEXACO

TEXACO Emulsified Asphalt
FOR GROUTING

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

In the heart of the job—
on America's Leading Railroads . . .

THE leading railroads of the country have proved Northwests on their maintenance-of-way and storeyard jobs. The Northwest Crawler is a real railway man's machine. Its simplicity alone makes it worth considering. The rugged design and construction with its cast steel bases and cast steel machinery side frames, stands up under heavy railway service — keeps shafts in alignment — and reduces wear. Easy operation, the result of the "Feather-Touch" Clutch Control, increases operating safety and keeps the output curve up. Northwest steering and Northwest Crawlers, with their self-cleaning action, takes Northwests where other machines have difficulty and make loading and unloading easier.

You are making long-time plans. The Northwest is the machine for the heart of your maintenance-of-way jobs and you can't afford to have anything but the best in the heart of the job! Plan to have Northwests in those *Key Spots*. Make it the Key Machine and your first Northwest will make you a repeat order buyer.

NORTHWEST ENGINEERING CO.
1513 Field Bldg., 135 South LaSalle St.,
Chicago 3, Illinois

NORTHWEST

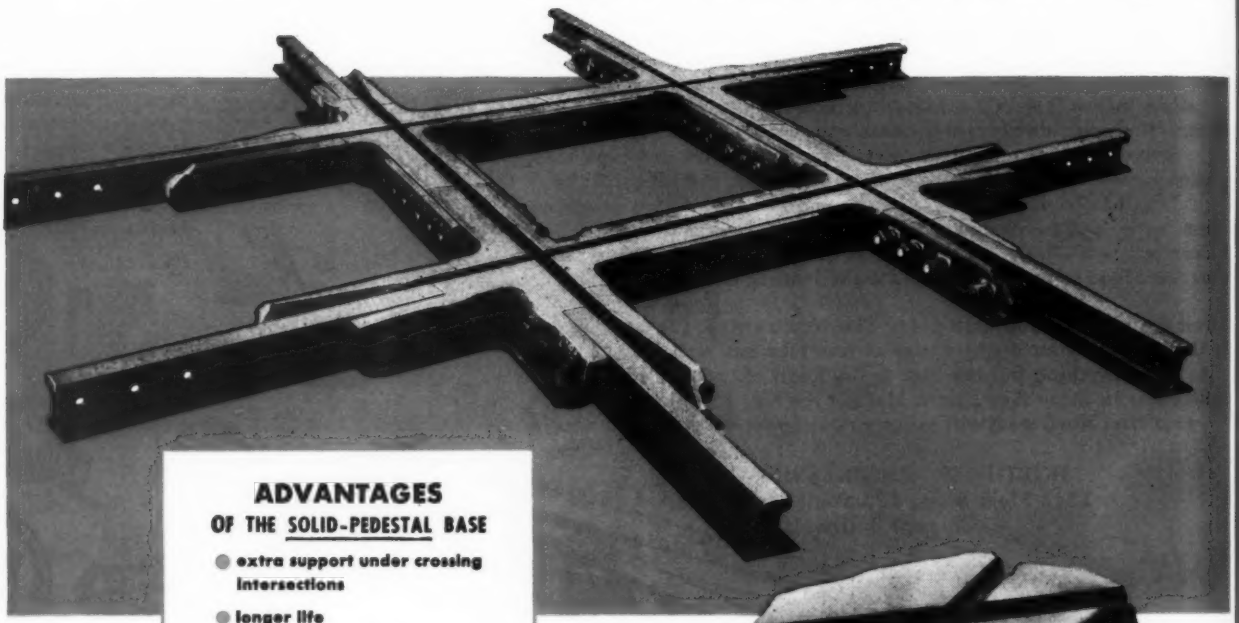
THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

The most important crossing improvement in recent years...

Solid-pedestal base ***plus***

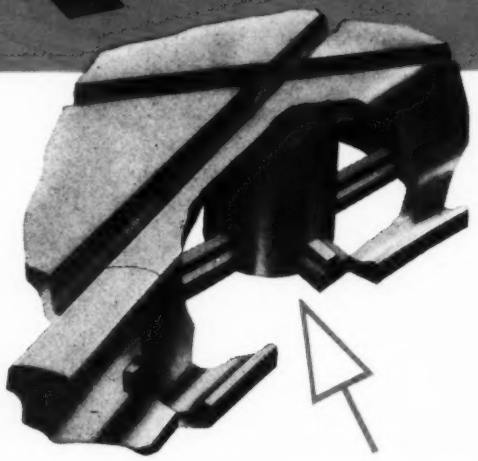
U·S·S MANGANESE STEEL

more durable, lower in



ADVANTAGES
OF THE SOLID-PEDESTAL BASE

- extra support under crossing intersections
- longer life
- improved physical properties
- sounder metal

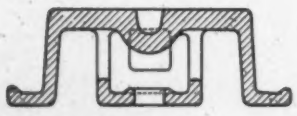


Compare these diagrams

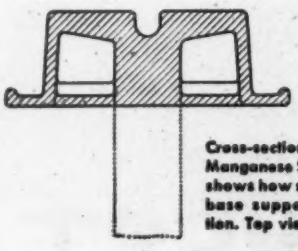
They show clearly why the U·S·S Manganese Steel Railroad Crossing is stronger and more durable.

Below the track intersection, where wheel impact is most severe, the ordinary crossing is hollow (below, left). In the U·S·S Crossing this part is of solid metal giving firm and additional support where it is needed most (center and right, below). It's easy to see why this construction lasts longer.

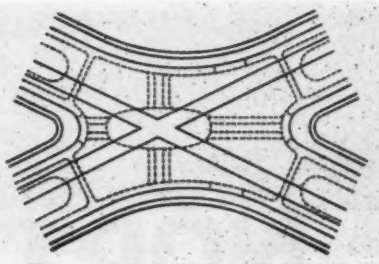
The dotted line in the center diagram indicates the approximate size of the reservoir necessary to handle the extra feed-metal used in casting a new U·S·S Manganese Steel Railroad Crossing. This reservoir (or riser), weighing from 200 to 350 lbs. is cut off and scrapped after the casting has solidified.



Cross-section of old-style manganese steel crossing. Note numerous ribs required to brace the intersection.



Cross-section of new U·S·S Manganese Steel Crossing shows how solid-pedestal base supports intersection. Top view at right.



depth-hardened corners ***make***

RAILROAD CROSSINGS

maintenance, smoother riding

A solid pillar of tough manganese steel directly under all crossing intersections is the exclusive feature that distinguishes this newly developed crossing. Here, where maximum strength is required to resist the destructive pounding of today's faster, heavier trains, the U·S·S Manganese Steel Railroad Crossing is extra strong.

The solid-pedestal base, an integral part of the casting, substantially reduces deflections resulting from wheel batter, a major cause of internal cracks that ultimately lead to complete deterioration of crossings. This vertical pillar of solid metal, rigidly reinforced, is far stronger than any other type of intersection support used today.

Metallurgical advances have improved new U·S·S Manganese Steel Railroad Crossings in still another way. By using more feed-metal (5 to 10 times more than is used in ordinary crossings) and exercising closer control over feeding, liquid metal under greater pressure flows unrestricted at the proper time to the solidifying area, preventing the formation of many of the pores and cavities characteristic of manganese castings.

Thus, in addition to the extra vertical support provided by the solid-pedestal base, the entire casting is sounder, freer of internal flaws, and less susceptible to spalling, chipping or cracking.

ADVANTAGES OF THE DEPTH-HARDENED CORNERS

- pounding-down of corners virtually eliminated
- maintenance costs greatly reduced
- much longer life due to higher impact resistance
- smooth riding without rebuilding

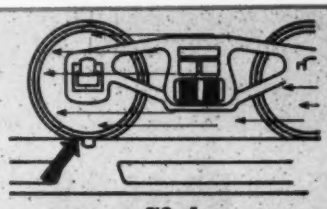


FIG. 1

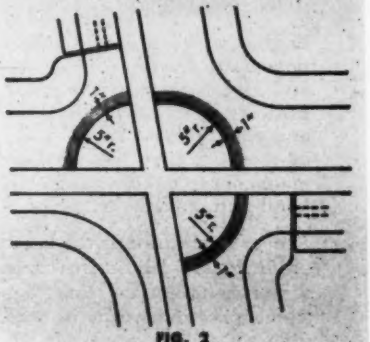


FIG. 2

FIG. 3

Depth-hardened corners reduce maintenance costs, assure smooth riding right from the start

Depth-hardening is another valuable, money-saving feature of the U·S·S Manganese Steel Railroad Crossing.

The ordinary manganese steel crossing is produced to a surface hardness of approximately 200 Brinell. The wheel batter of the first long train is depended on to work-harden the surface to approximately 400 Brinell—the hardness required to stand up under modern rail traffic. Though crudely effective, this wheel pounding also batters down the intersection corners—makes it necessary to build them back to normal track level repeatedly by welding and grinding. This costs money.

In contrast, the improved U·S·S Railroad Crossing has raised pads cast integrally on the three critical crossing corners of each intersection. These are shop-hammered to develop the desired hardness, and then ground down to track level to assure smooth riding. This controlled pre-hammering insures the proper depth hardness *before* installation, eliminates almost entirely the damaging effect of subsequent wheel batter, and virtually eliminates maintenance costs.

Here's why pre-hammered, depth-hardening reduces crossing maintenance

Wheel pounding is the only way the ordinary manganese steel crossing gets sufficient hardness. (Fig. 1) The first long train that batters across the intersection crudely work-hardens the steel to approximately 400 Brinell. But it also batters down the corners about ¼". It takes expensive welding and grinding to rebuild the corners back up to track level.

We avoid this trouble by casting the U·S·S Manganese Steel Crossing with ⅜"-high pads on the three critical corners (see Figs. 2 and 3). These pads are carefully shop-hammered close to track level to develop approximately 400 Brinell hardness, and are then ground to true level *prior* to installation. It saves time and money, gives you a smooth-riding crossing without rebuilding.

For the complete story on this crossing, send for descriptive literature. Coupon is attached for your convenience.

United States Steel Company
Room 4303, 525 William Penn Place
Pittsburgh 30, Pa.

Please send me a copy of bulletin "Improved U·S·S Manganese Steel Railroad Crossings."

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Company.....

Address.....

City.....Zone.....State.....

1-912

USS

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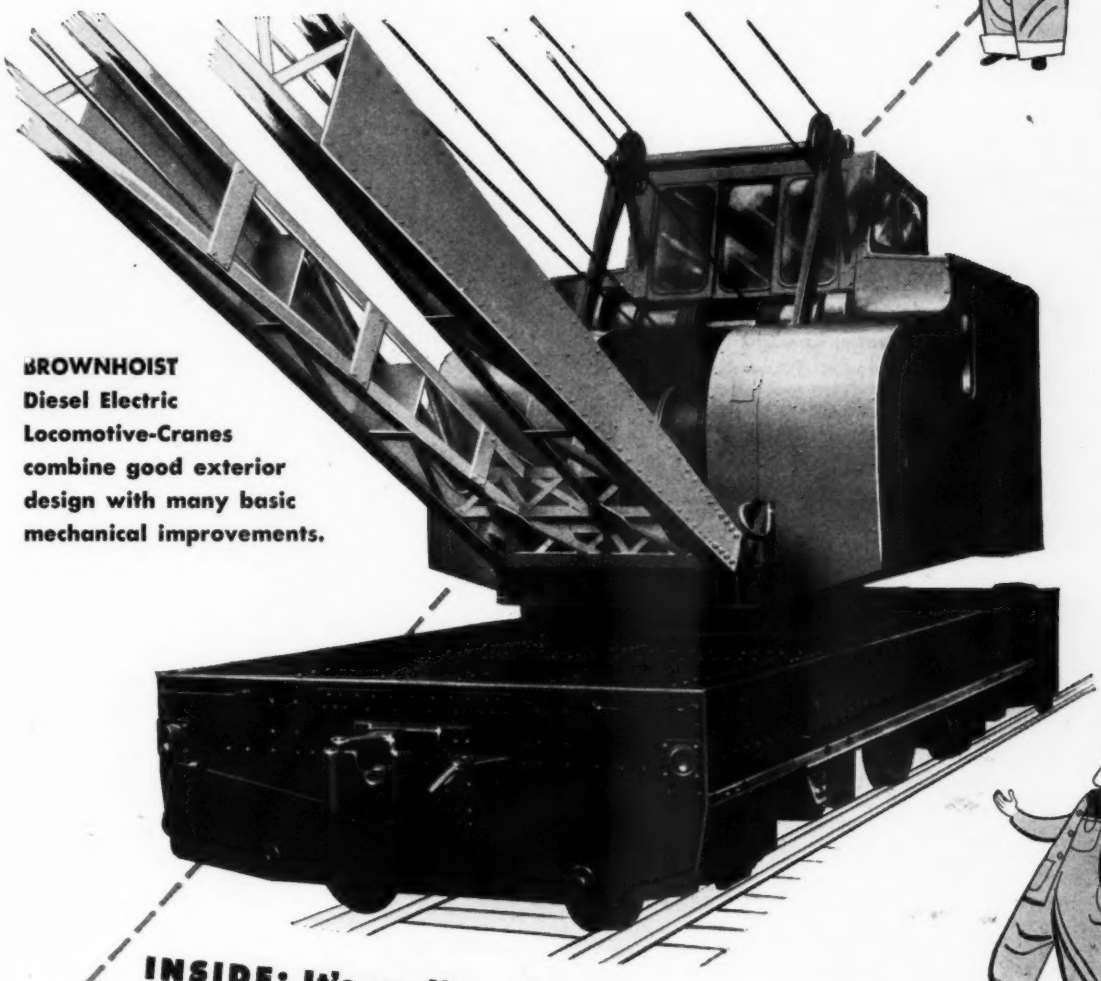
UNITED STATES STEEL

OUTSIDE: It's a beauty Extra-heavy Streamlined MONITOR-TYPE CAB! 360° visibility! All controls conveniently located; all machinery fully protected from the weather, yet accessible. New CLEAR VISION BOOM. 14 inch safety clearance between car body and upper works.



BROWNHOIST Diesel Electric Locomotive-Cranes combine good exterior design with many basic mechanical improvements.

INSIDE: It's really engineered New DYNAMATIC CLUTCH gives smooth, sensitive 32-step control, banishes slippage, eliminates torsional impulse and vibration. Safe FRICTION CLUTCH BOOM HOIST driven by worm and wheel in oil bath. Twin-barrelled, extra-large boom-hoist drums take all line in one layer. New Wide-faced Hoist Drums mounted on roller bearings with air cylinder mounted within the drum. ELECTRIC ROTATION and electric travel reduce maintenance to a minimum. Optional features include 8-WHEEL CHAIN DRIVE for increased drawbar pull and TWIN ENGINE DRIVE where greater tractive effort is required.

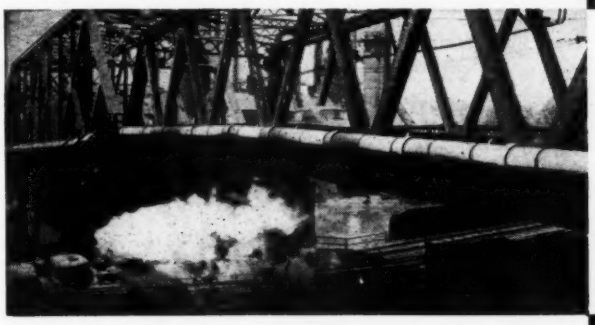
147

BROWNHOIST

INDUSTRIAL BROWNHOIST CORPORATION, BAY CITY, MICHIGAN

DISTRICT OFFICES: New York, Philadelphia, Cleveland, Chicago, San Francisco, Canadian Brownhoist, Ltd., Montreal, Quebec. **AGENCIES:** Detroit, Birmingham, Houston, Los Angeles

Resists corrosion...



Withstands vibration...

Saves on installation...

...3 good reasons why TRANSITE PIPE cuts railroad water-line costs to the bone!

HERE'S WHY many of the country's leading railroads have invested in Transite* Pressure Pipe as the key to *long term* water-line economy:

Resists corrosive soils—Transite Pipe is made of asbestos and cement, steam-cured under pressure to give it exceptional corrosion-resistance. That's why this pipe stays strong, even when exposed to such highly corrosive soils as cinder fills, salt marshes and other acid or alkaline soil conditions.

Withstands traffic shocks, earth movements—Transite's Simplex Couplings make up tight, stay tight in service. And because these joints are flexible, they absorb the shock and vibration of train traffic, help compensate for soil movements and other stresses—providing a constant safeguard against leakage of water into adjacent soil and protecting against costly pipe failures.

Saves on installation, gives long service—Pipe-laying crews can lay more pipe per day with Transite because it is light in weight, easy to handle, and because the simple coupling method used speeds up assembly, saves time on the job. And these initial installation economies are followed by long-term economies in both operation and maintenance that help assure lower water-line costs over the years.

For further information about Transite Pipe, write for Brochure TR-11A. Just address Johns-Manville, Box 290, New York 16, N. Y.

*Transite is a Johns-Manville registered trade mark

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Illustrated: The Model PB-B Woolery Weed Burner, can be towed by motor car. 3 other sizes available.

WAGE WAR ON WEEDS with a WOOLERY

Here is the ideal yard weed burner—the PB-B! It does a remarkable "on-the-line" job, too—because it can be quickly set off track by only two men. Destroys a 15-foot swath on one trip and, with burner arms extended on return trip, burns a 25-foot swath.

Woolery Weed Burners have electrically ignited, separately controlled burners—with individual controls for moving in any direction **while in operation!**

Woolery Weed Burners are your most effective **low cost** means of all **types** of weed control as well as for **snow and ice removal!**

WOOLERY **Machine Company**
Minneapolis 14, Minnesota

For additional information, use postcard, pages 871-872

Another Ingersoll-Rand FIRST

A HEAVY DUTY AIR TAMPING GUN

Two New Size MT8 Tamping Guns operated by an Ingersoll-Rand 3R36 Spot Air Compressor, tamping track on a bridge approach.

- DEVELOPS TWICE THE POWER OF STANDARD TAMPING GUNS!
- USES STANDARD TAMPING STEELS!
- WEIGHS ONLY 54½ POUNDS!
- GETS TOUGH JOBS DONE IN A HURRY!

Additional Features

- AIR INLET IS QUICKLY CHANGED TO LEFT HAND OPERATION
- CONVENIENT, PROTECTED THROTTLE
- LOW AIR CONSUMPTION
- EASY TO LUBRICATE
- EASY HOLDING

The NEW MT8 Tamping Gun is specifically designed for the heavy duty tamping work required by the current trend toward heavier rails, longer ties and increased traffic. This tamping tool gives an extra tight job at points of fixed elevation, such as cross-overs, turn-outs, and bridge approaches.

The easy-holding MT8 develops twice the power of the MT4 . . . the standard Tamping Gun for general tamping work. Two MT8's can be operated from the highly portable 3R36 Spot Air Compressor, a compact unit designed to complete the Ingersoll-Rand Tamping Team!

Call, write or wire your nearest I-R branch office for complete details!

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COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES

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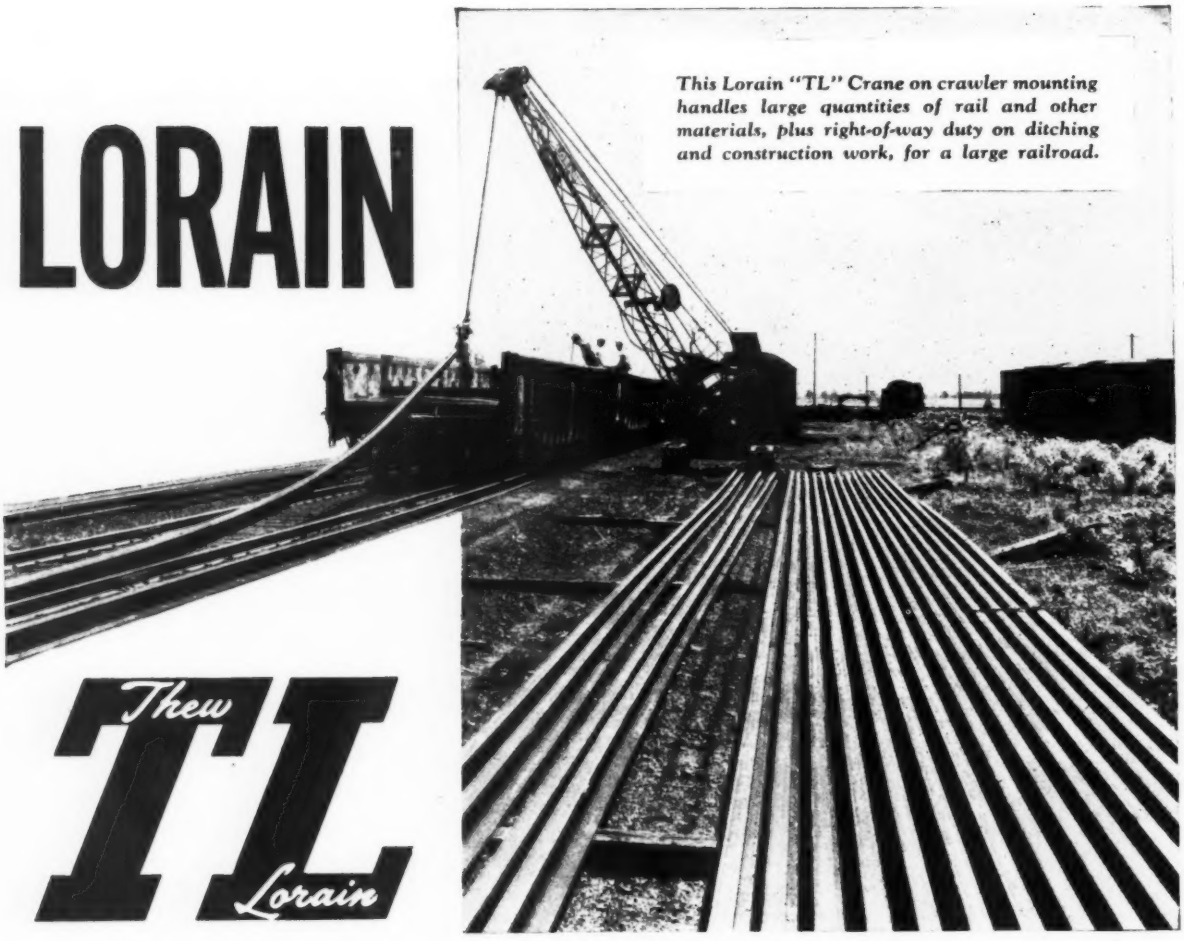

This Lorain "TL" Crane on crawler mounting handles large quantities of rail and other materials, plus right-of-way duty on ditching and construction work, for a large railroad.

Thew **TL** Lorain

HERE'S CRANE POWER THAT *FITS* RAILROAD NEEDS

You can assign most any lifting, loading or digging job to a Lorain "TL" Crane . . . on the right-of-way . . . in yard or round house . . . and come up with savings that will soon write off your investment.

Job-wise, Lorain TL's can work on or off-track, on or off-cars. They are mobile and versatile. Loading and unloading cars . . . handling rail, ballast, sand . . . excavating for drainage ditches or new road beds . . . those are but a few of the cost-cutting tasks your Lorain "TL" will perform.

In design features, the "TL" has no comparison. It's the last word in a ¾-yard class machine, with these features for multi-purpose efficiency and long life. . . .

A Complete Package • Interchangeable "Packaged" Components • 5 Identical Clutches • Anti-Friction Bearings • Oil-Enclosed Cut Gears • Interchangeable Parts • One Piece Bed • Hook Rollers • Two-Speed Crawler • Drop Forged Treads • Positive Travel Lock • "Full Circle" Steering • Rubber-Tire Mountings • Positive Independent Shovel Crowd • All-Purpose Crane Boom

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DRAGLINES • CLAMSHELLS
ON CRAWLERS OR RUBBER TIRES

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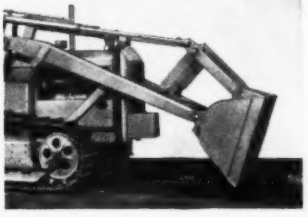
of Cost-Cutting Features

When it comes to cutting loading costs... stepping up profits, the Oliver Model "B" Crawler and Ware Loader is "loaded" with *plus* features.

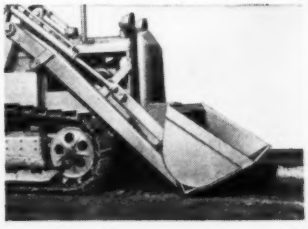
Take the hydraulically controlled bucket, for example. 110° bucket rotation and 28° "roll back" give you a full bucket every time. "Breaking out" action is 3 times the lifting effort of the loader... a particularly important advantage when loading-out hard-packed material or for stripping operations. Bucket level is automatically maintained when lifting load, preventing wasteful spillage. You can control speed of discharge... fast or slow, easily and gently. Working area can always be kept level.

The Oliver-Ware "B" loader was designed and built exclusively for Oliver Model "B" tractors. Its ideal fit with the tractor eliminates unneeded dead weight and assures maximum stability for the entire unit. The Oliver semi-rigid axle allows limited oscillation of the track, eliminating the possibility of track-frame distortion. A hydraulic shock absorber smooths out pressure surges... prevents damage to loader and tractor parts.

For complete information on how the Oliver-Ware Model "B" tractor loader can cut costs for you, see or write your Oliver Industrial Distributor.



Plenty of power, plus the wide angle of bucket rotation, assures faster, more positive digging. 28° "roll back" assures maximum break-out action for a full bucket every time.



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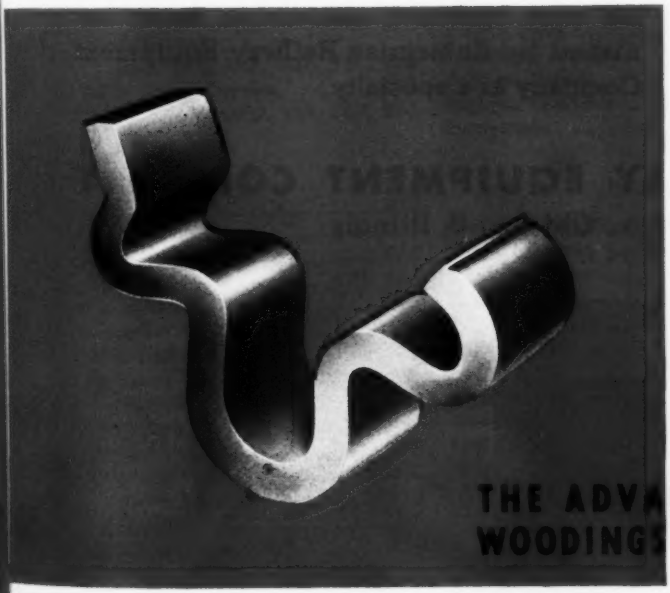
Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio

A complete line of industrial wheel and crawler tractors

IT'S THE "WORLD'S MOST POWERFUL RAIL ANCHOR"... IMPORTANT FOR HOLDING PURPOSES BUT,

equally important

for Re-application Value



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Multi-Service

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FOR BALLASTING OR COMMERCIAL SERVICE

Deposits ballast in place and quantity desired.
100% discharge.
Easy, one-man operation.
All ballast deposited clear of rails.
Reduces time, labor, and cost of ballasting.

50-ton and 70-ton Enterprise Multi-Service Ballast Cars may be built by any car builder, the door operating mechanism being furnished by Enterprise Railway Equipment Company as a specialty.

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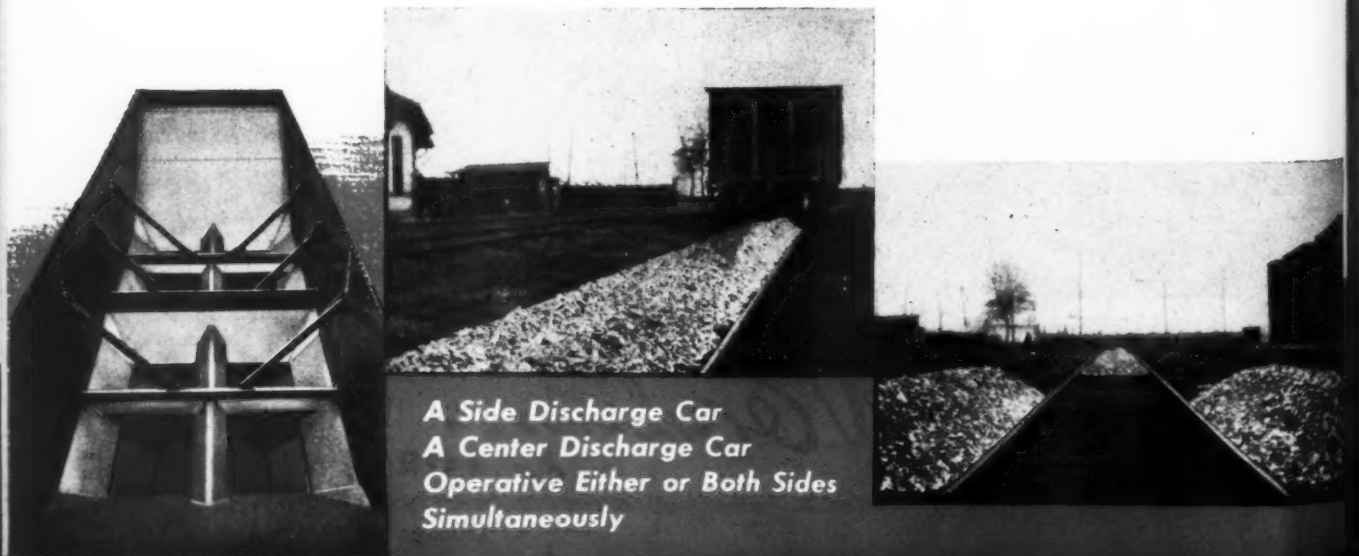

A Side Discharge Car
A Center Discharge Car
Operative Either or Both Sides Simultaneously

ADDITIONAL INFORMATION

On Any of the Products Mentioned in This Issue

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

Products Index

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The Cost to the Railroads . . .

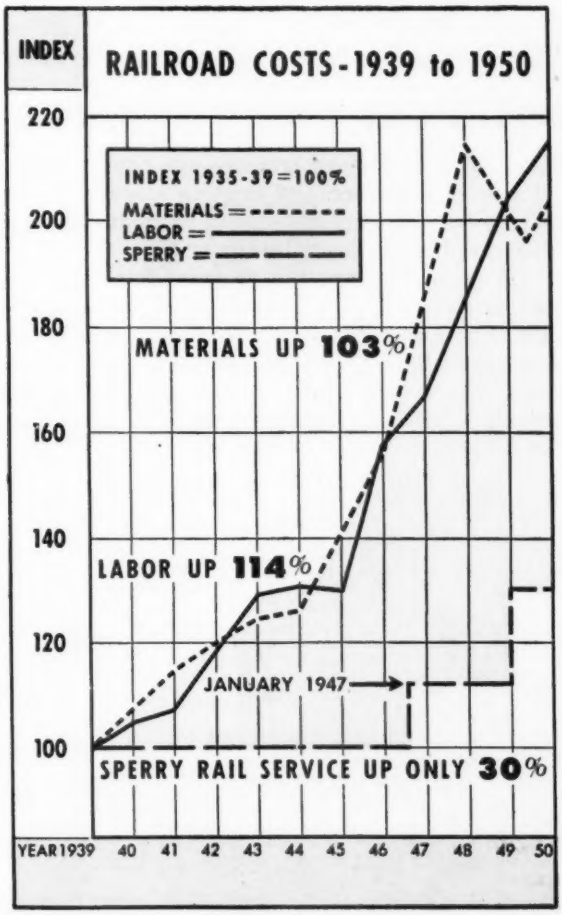
for **MATERIALS AND LABOR** increased over **100%** since 1939

for **SPERRY RAIL TESTING** increased only . . **30%** since 1939

Sperry Rail Service has not yet been forced to increase prices in proportion to the general increase in the cost of materials and labor because:

1. **CONTINUOUS RESEARCH AND DEVELOPMENT . . . produced better equipment, combined with . . . .**

2. **EXTENSIVE TRAINING AND OPERATING PROCEDURE IMPROVEMENTS . . . . resulted in economies which have offset a major portion of increased material and labor costs to Sperry.**



* The Bureau of Railroad Economics completed, in 1950, an index of railroad material prices using the period from 1935 to 1939 as 100.

Thus in a period of more than ten years, Sperry's prices for rail testing have risen only 30%; while labor costs have climbed 114% and materials have progressed to 103% above previous levels.

Sperry
FIRST IN RAIL TESTING

SPERRY RAIL SERVICE

DIVISION OF SPERRY PRODUCTS, INC.

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DESIGNED FOR YOUR JOB

These Allis-Chalmers tractors are new models, not merely refinements of existing ideas . . . they are new from the ground up . . . without compromise anywhere in design or material.

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BUILT TO "TAKE IT" . . .

These are the finest tractors ever built . . . with ample capacity and strength in every part! And that's no accident! To bring you tractors like these . . . with the qualities you want . . . Allis-Chalmers built them completely new.

You can depend on them to take the loads and jolts of today's jobs . . . because they are modern tractors built for the most grueling operating conditions. They will more than measure up to your expectations!

HD-5
40.26 drawbar hp., 11,250 lb.

HD-9
72 drawbar hp., 18,800 lb.

YEARS AHEAD

Each of these new Allis-Chalmers crawlers gives you a new yardstick for rating tractors. Each sets new standards in its class for performance, strength, servicing, operation. Get the full story from your Allis-Chalmers dealer NOW on this — The Newest, Finest Tractor Line on Earth.

ALLIS

TRACTO

Tractor Line on Earth!

EASY TO OPERATE . . .

Operators have long awaited the greater handling ease and comfort now brought to them by this new line of Allis-Chalmers tractors.

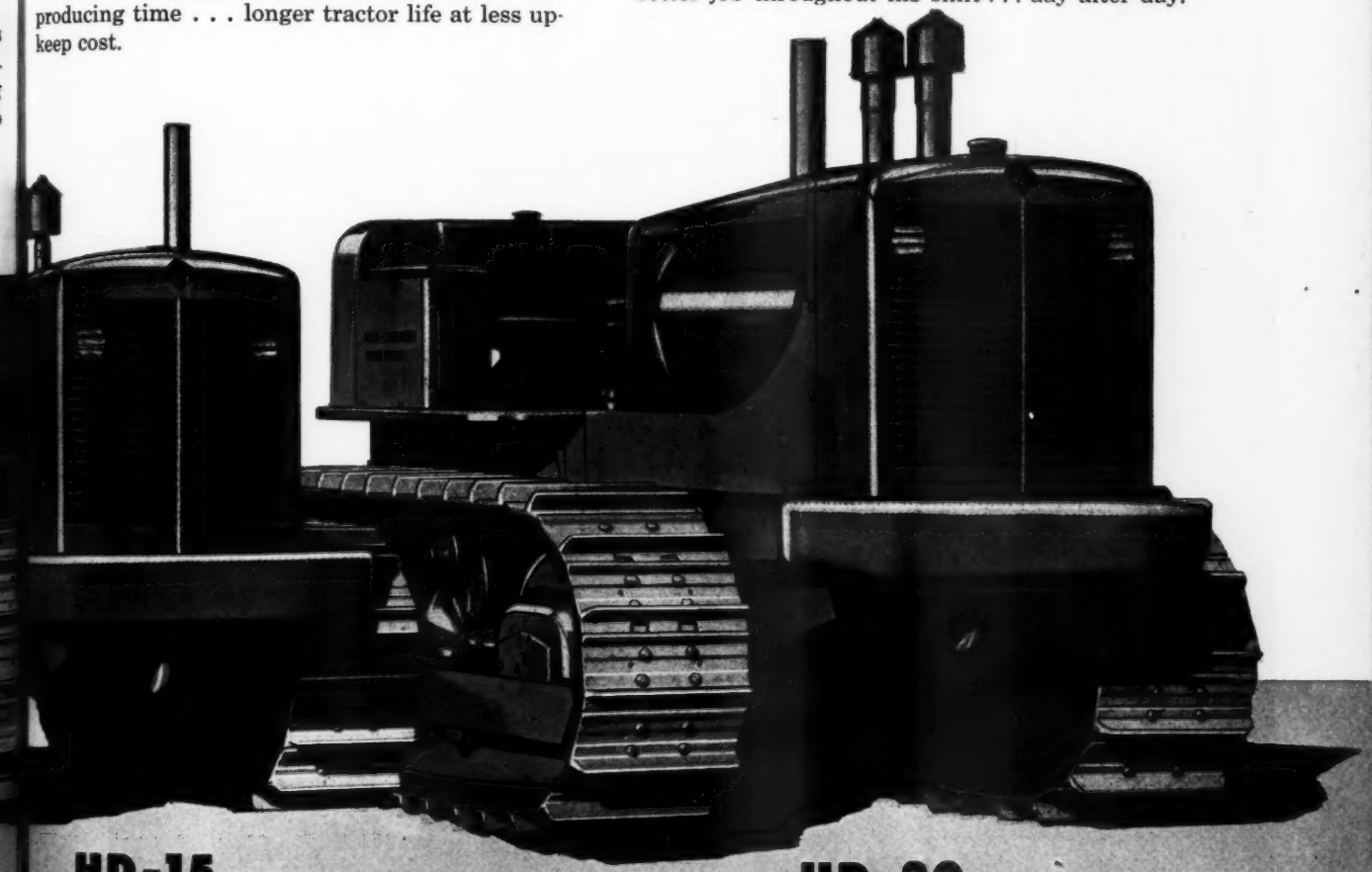
Conveniently located controls respond to the slightest effort . . . and are operated in the same familiar way—nothing tricky to "catch on to." There is new shifting ease, new seat and platform comfort, full visibility.

Because the operator's job is easier — takes less effort — he can maintain a steady pace, do a better job throughout his shift . . . day after day.

EASY TO SERVICE . . .

Adjustments are easier . . . lubrication simplified and lube periods greatly extended. Mechanics say these tractors are the easiest to service and repair.

This all adds up to less down time, more producing time . . . longer tractor life at less upkeep cost.



HD-15
drawbar hp., 27,850 lb.

HD-20
Hydraulic Torque Converter Drive, 175 net engine hp., 41,000 lb.

CHALMERS

IVISION • MILWAUKEE 1, U.S.A.

Built in 1934... B&O Aluminum hopper car still needs no major repairs

Hoppers rotting out by coal-acid corrosion. Low ratio of load to car weight . . . Two big problems the B & O set out to solve with aluminum 17 years ago.

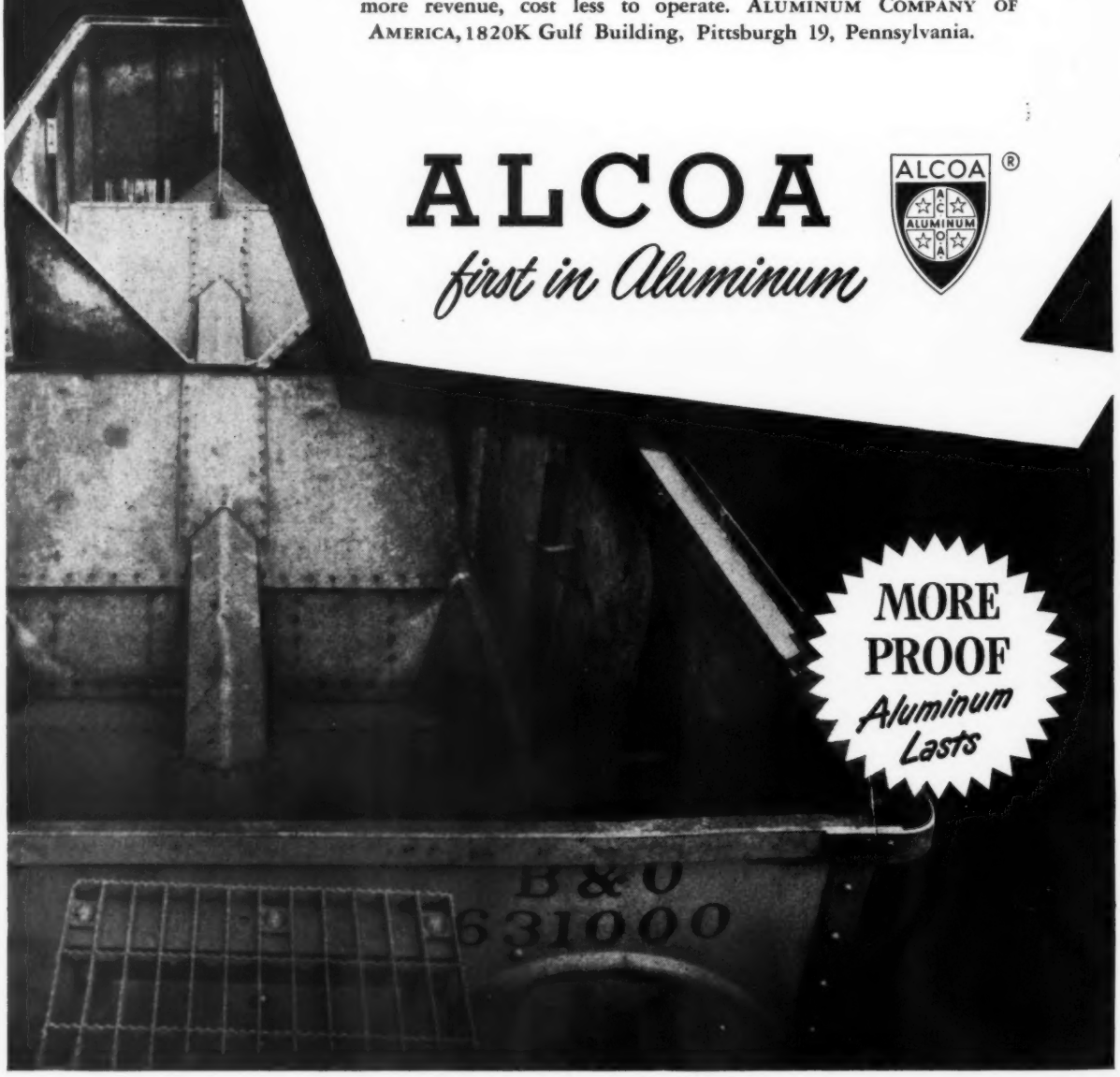
Aluminum hopper No. 631,000 has lived up to their fondest hopes. It has kept on the job with only infrequent light repairs. Aluminum's natural resistance to corrosion paid off in substantial maintenance savings. The light weight of Alcoa Aluminum improved the load-to-tare ratio from 2½-to-1 to 5-to-1.

Keep an eye on aluminum rolling stock. Its year-after-year performance will help you plan for future equipment that will earn more revenue, cost less to operate. ALUMINUM COMPANY OF AMERICA, 1820K Gulf Building, Pittsburgh 19, Pennsylvania.

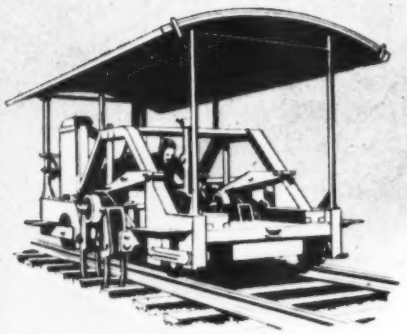
ALCOA

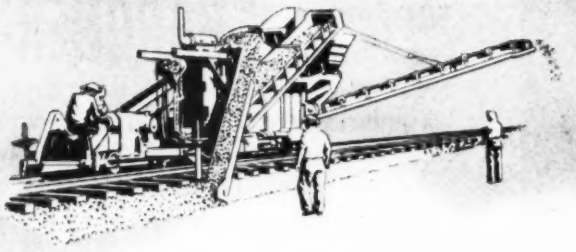
first in Aluminum

ALCOA ® ALUMINUM



Keep Ahead of Trackwork Schedules





with Matisa

TAMPER and CLEANER

AVAILABILITY

Long-run payoff on your trackwork equipment is how great a percentage of working availability you get from each machine. With Matisa equipment, you have two important factors that produce maximum equipment availability to keep ahead of trackwork schedules:

★ **STRUCTURAL DEPENDABILITY**

★ **IMMEDIATE ACTION ON PARTS AND SERVICES**

Matisa Automatic Tampers and Matisa Ballast Cleaners are without the "bugs" and "weak links" that frequently cause delays out of all proportion to their structural importance . . . And being structurally designed for continuous performance, both machines offer a degree of dependability we believe is unequalled in trackwork equipment now available.

Where long use or unusual conditions require parts or engineering service, Matisa maintains around-the-clock facilities which provide immediate action whenever and wherever necessary.

Ask our M. W. Engineering Department for details on the Matisa machines that are setting new standards for ballast cleaning efficiency and tamping precision throughout the world.

THE MATISA EQUIPMENT CORP.
224 South Michigan Blvd. • Chicago 4, Illinois

ALL OVER THE WORLD *Matisa* TRACKWORK SPECIALISTS

tough floors for tough conditions

BLUE TEMPER

FEREM FLOORS

In your plant you can have dense, ductile floors almost diamond hard, which are not slippery, showing no noticeable wear for long periods and involving practically no upkeep costs. Such floors are constructed with Ferem, the "Blue Temper" component in the floor topping, replacing sand, stone and silica.

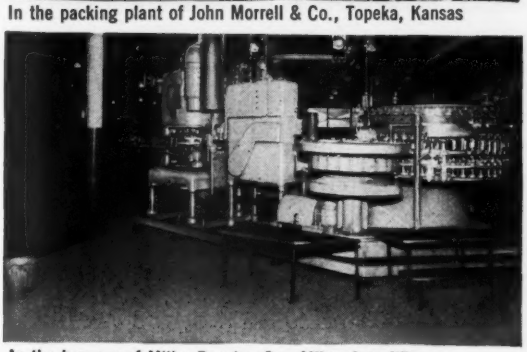
Ferem is used in heavy duty floors, loading platforms, corridors and runways in newly constructed buildings, or when replacing worn or eroded floors. Ferem is resistant to the corrosive action of chemical solutions—and highly slip-proof under the wet floor conditions of many industries.

USED IN
- Breweries and Beverage Plants
- Distilleries
- Dairies
- Packing Houses
- Canning Plants
- Chemical Plants
- Industrial Plants

In the Sucrest refinery of American Molasses Co., Brooklyn, N. Y.

In the kitchens of Thrifty Drug Chain, Los Angeles, Cal.

In the packing plant of John Morrell & Co., Topeka, Kansas



In the brewery of Miller Brewing Co., Milwaukee, Wis.

A. C. HORN COMPANY, INC.

MANUFACTURERS OF MATERIALS FOR BUILDING MAINTENANCE AND CONSTRUCTION

10TH STREET & 44TH AVENUE, LONG ISLAND CITY 1, N. Y.

LOS ANGELES • SAN FRANCISCO • HOUSTON • CHICAGO • TORONTO

SUBSIDIARY OF SUN CHEMICAL CORPORATION

HORN PRODUCT

RE-51

GENTLEMEN:

Please send complete data on FEREM FLOORS.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

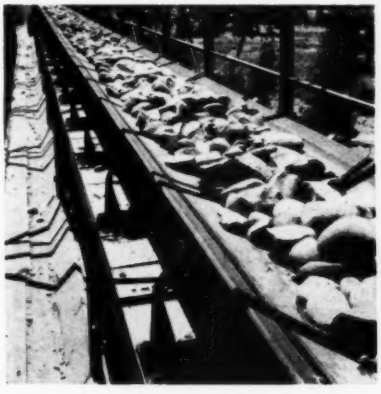
What do you want a bearing to do?

CARRY HEAVY LOADS? If you need top load capacity in bearings, Timken® roller bearings can give it to you. Due to line contact between rollers and races, Timken bearings have extra load capacity —one big reason why they're used in the sheaves of the heavy-duty shovel above.

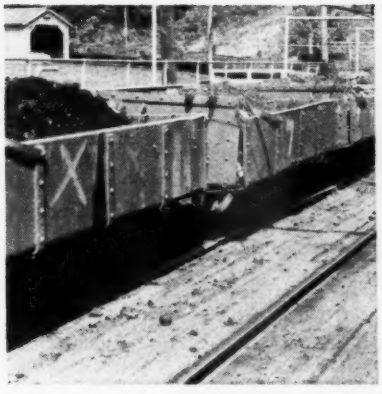
INSURE PRECISION? Leading machine tool manufacturers specify Timken tapered roller bearings where precision counts the most—on the spindle. Timken precision bearings can be furnished with a maximum runout of seventy-five millionths of an inch (.000075") if needed.

TAKE COMBINATION LOADS? Because Timken bearings are tapered, they take both radial and thrust loads. Auxiliary thrust bearings or plates are eliminated. Wheels of the grader above are an example of where Timken bearings carry both radial and thrust loads.

TIMKEN® bearings do it!



CUT MAINTENANCE COSTS? Timken bearings permit use of closures which keep lubricant in—dirt and moisture out. Maintenance and lubrication time are minimized. Belt conveyors are an important example of the many types of equipment where Timken bearings have helped cut maintenance costs.



MINIMIZE FRICTION? What makes these mine cars easier starting? Timken bearings on the axles. Due to true rolling motion and smooth surface finish, Timken bearings minimize friction. And Timken bearings *stay* friction-free because their case-carburized rollers and races resist wear.

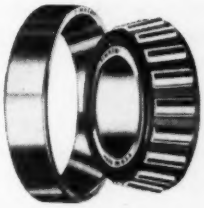
INSURE LONG LIFE? This car has operated for 18 years with Timken bearings in the drive. Timken bearings help moving parts last longer by keeping them in alignment. Timken bearings themselves wear better because they're engineered for the job, precision manufactured, made of Timken fine alloy steel.

Be sure to specify Timken roller bearings for the machines you make or use. Look for the trademark "Timken" on the bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ←◫→ LOADS OR ANY COMBINATION ←◫→

"Fissures" in Crossties Are Expensive Too

Although not as dangerous as transverse fissures in rails, split and checks are the mot prevalent basic causes of premature failure in crossties. But a new process now provides strict seasoning control and better preservative treatment that add years to service life.

IT WAS in 1911 that transverse fissures first were recognized as a serious cause of rail failures. In the years that followed, thousands of defective rails were removed from track before an observant metallurgist, poring over service reports, noticed that this most dangerous of all rail defects occurred much more frequently in rail rolled in winter. How, he asked himself, did summer-rolled rail differ from the winter product? Thus began a long series of investigations and tests that eventually culminated in perfecting a controlled cooling process that has virtually eliminated transverse fissures, lengthened the service life of rails and saved the railways thousands of dollars.

Like transverse fissures in rails, splitting and checking are among the most serious causes of decay, premature failure and untimely replacement of ties. As in the early days of transverse fissures, many people still accept checking and splitting of crossties as "natural" and unavoidable.

Checks and splits usually start during the long air-seasoning period before preservative treatment. After treatment and installation in track, these splits usually progress, and sooner or later rupture the treated envelope and expose untreated wood. Spores of wood-destroying fungi and decay thus get an unhindered foothold; too soon the tie must be replaced.

But just as controlled cooling has eliminated transverse fissures so has a modern technological process known as Vapor-Drying* largely stopped checking and splitting because it eliminates the air-seasoning period. Green crossties are shipped from sawmills directly to treating plants where their moisture content is reduced and preservatives added in hours instead of long months.

Everyone who inspects Vapor-Dried ties newly installed in track remarks on their comparative freedom from checks and splits, usually so evident even in new hardwood ties. Then after varying periods of service (one controlled test is now in its eighth year), the difference between air-seasoned and Vapor-Dried ties is even more remarkable. Small checks in Vapor-Dried ties do not progress in length and depth. Decay gets little chance to get in and start its dirty work. Naturally such ties should last longer.

There is plenty of evidence to indicate that a railroad which goes to Vapor-Dried crossties can eventually save $100 a mile yearly — and up — in maintenance costs. And there are more benefits, such as being able to use plentiful and less expensive woods such as gum which makes long-lasting and dependable crossties when Vapor-Dried.

Norfolk & Western, whose Vapor-Drying plant is now in its second year of operation, has tested and thoroughly proved the many advantages of the new process. Other roads including the Southern, Atlantic Coast Line, Charleston & Western Carolina, Clinchfield, and Piedmont & Northern also use Vapor-Dried ties. Still other roads are investigating; preliminary reports are favorable.

Why not let us tell you about the outstanding advantages and economies of Vapor-Drying? You and your engineers will find our story interesting and profitable listening. Write Vapor-Drying Division, Taylor-Colquitt Co., Spartanburg, S. C.

This is the fourth in a series of discussions on the economic aspects of Vapor-Drying. Another will appear soon.

TAYLOR-COLQUITT CO. T·C TIMBER CONSERVATION ®

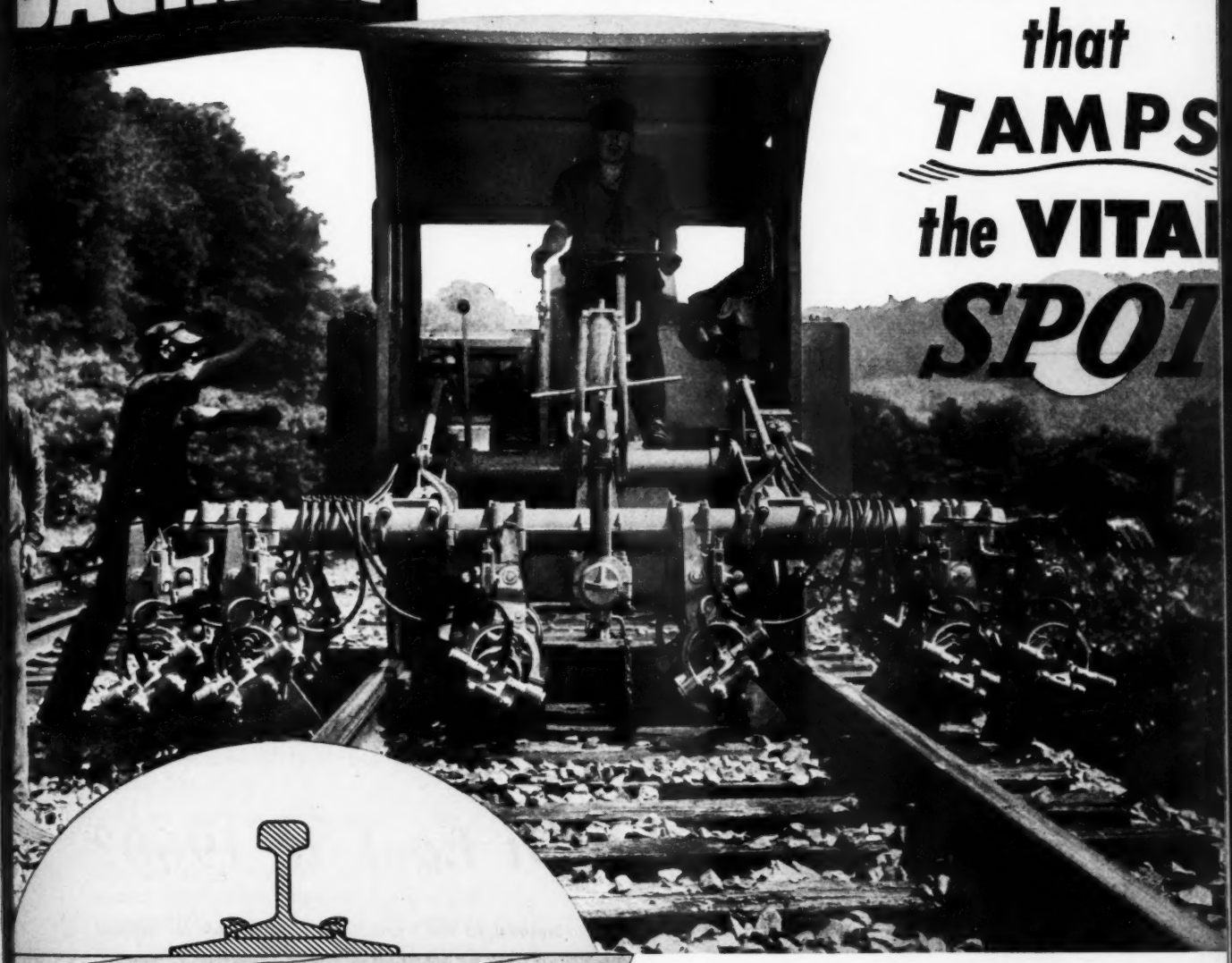
(Advertisement)

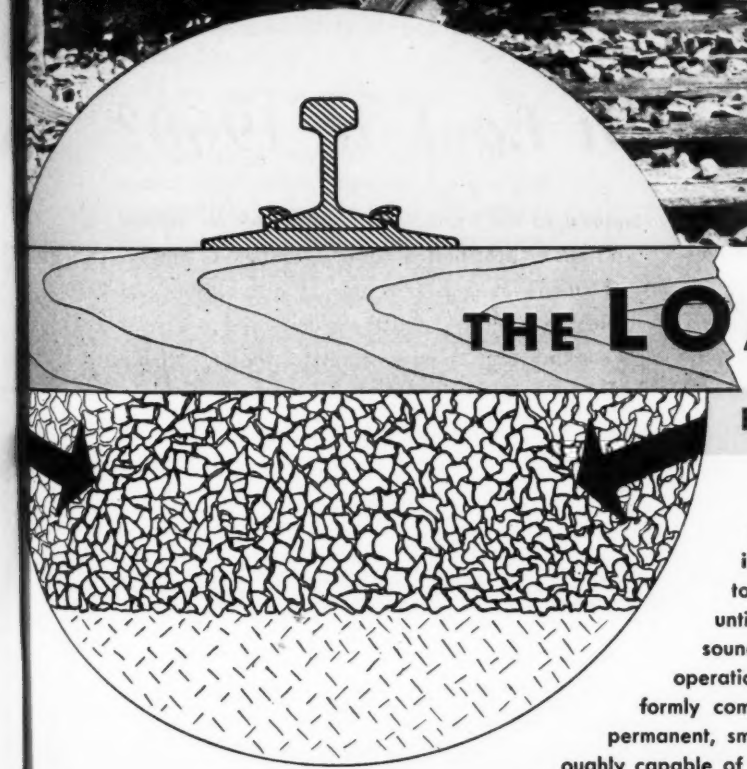
*Process patented

JACKSON *The* ONLY MULTIPLE TAMPE*

that TAMPS *the* VITA*

SPOT



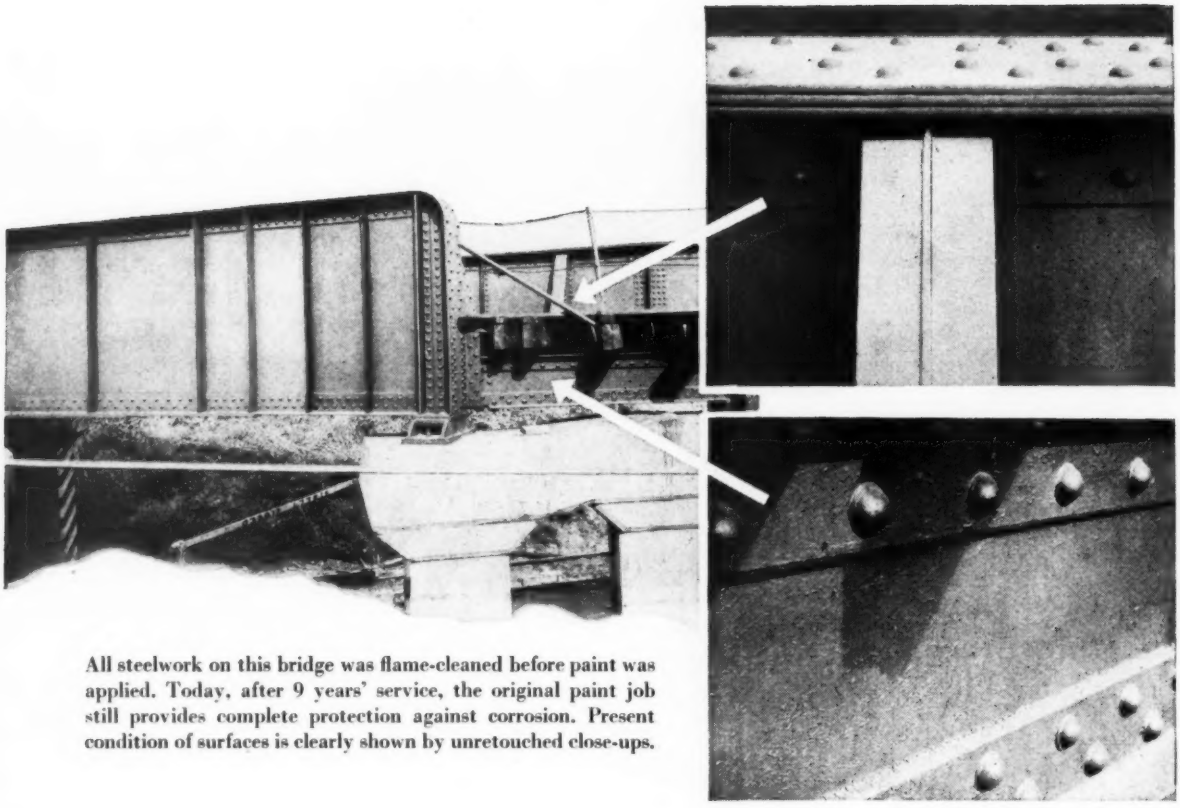


THE LOAD-*BEARING* ZON*

DIRECTLY BENEATH THE RA*

In the actual photo and the diagrammatical sketch above, n how the blades of the Jackson Multiple Tamper are directed un the ties, **right beneath the rails where the greatest load imposed.** Here, in the VITAL ZONE, the powerful thrust and vib tory action of the Multiple's tamping blades force the ballast arou until the pieces are tightly fitted together into a closely integrat soundly compacted and lastingly-firm bed. And it all can be done in operation with no follow-up of any kind required. Only the JACKSON u formly compacts maximum ballast in this critical area to produce the m permanent, smooth-riding track, with tie-beds having load bearing qualities th oughly capable of sustaining today's heavy, fast, high-frequency traffic—a vital fac in reducing the cost of maintaining track and rolling-stock. Savings in time and la effected with these machines usually more than pay for them in a single season. Let us furnish y with complete information, NOW, so you can consider them for your 1952 appropriations.

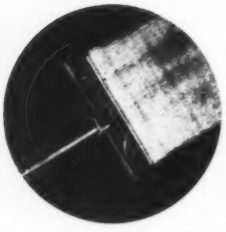
ELECTRIC TAMPER & EQUIPMENT CO. LUDINGTO MICHIGA



All steelwork on this bridge was flame-cleaned before paint was applied. Today, after 9 years' service, the original paint job still provides complete protection against corrosion. Present condition of surfaces is clearly shown by unretouched close-ups.

Your Steelwork . . .

How Will It Look in 1960?



Steelwork you coat with good paint today can still look like new ten years from now, *if you flame-clean all exposed surfaces first.* And what you'll save on maintenance, because of increased protection due to flame-cleaning, should more than pay for all the apparatus and materials you need for the job.

Flame-cleaning is simple to do, requires little equipment, and costs little. A brush of oxy-acetylene flames pops off scale and drives out moisture. Paint applied to the warm, dry surface goes on quickly and smoothly, bonds tightly, and lasts longer.

Flame-cleaning is only one of many time- and moneysaving OXWELD methods developed as a result of working with American railroads for more than a third of a century. So, whatever your problem, whether it's in the shop or out on track, there is a good chance that OXWELD know-how, show-how, and equipment can help you do it better, quicker, and at lower cost.

P. S. Send for additional information on flame-cleaning.

OXWELD RAILROAD SERVICE COMPANY
A Division of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York
In Canada:
Canadian Railroad Service Company, Limited, Toronto

OXWELD RAILROAD SERVICE

SINCE 1912 THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

The term "Oxweld" is a registered trade-mark of Union Carbide and Carbon Corporation.

Two-way time savers on foundation jobs!

Easily extendible Monotube steel piles

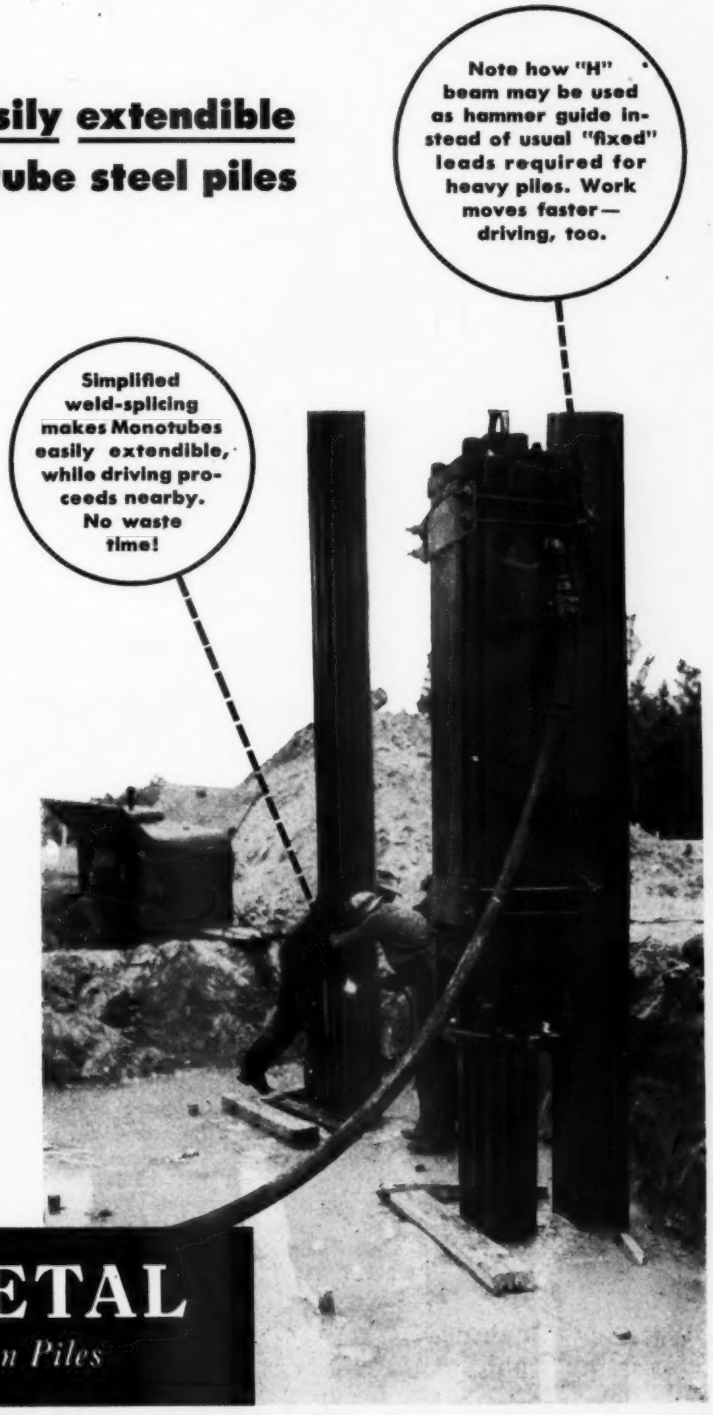
WHEN you find that your foundation piles are driving longer than predicted, the problem is solved quickly with Monotubes. These taper-flute steel piles can be extended easily—right on the job—right to the length you require! Cut-offs can be made easily, with minimum waste. Saving No. 1!

And, extensions can be welded while other bottom sections are being driven. Saving No. 2!

That's just part of the story on how Monotubes help you save time—save critical materials—and save money. Here's more! Monotubes' tapered design and cold-rolled properties provide unusually high bearing values and exceptional lateral stability. High load-bearing values can often be met with fewer piles.

Because Monotubes are lighter in weight, handling and locating go easier and faster. On most jobs a standard, light crane can be used for driving.

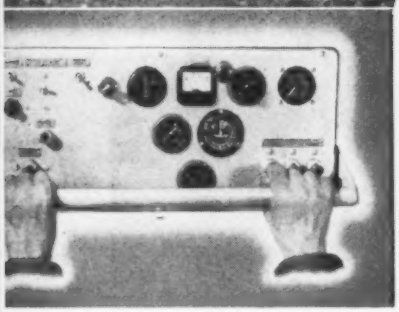
Send for complete information. Find out how Monotubes' many advantages bring extra savings in time, in money, on all types of foundations. Write The Union Metal Manufacturing Company, Canton 5, Ohio.



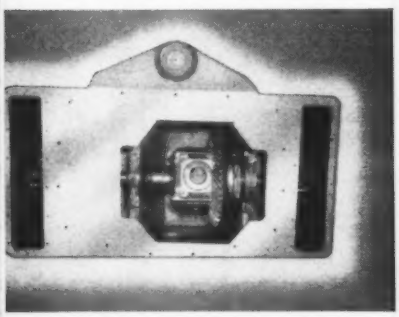
UNION METAL
Monotube Foundation Piles

Rubber-tired D Roadster TOURNAPULL

goes anywhere to speed rail maintenance



Dashboard switches control steering and scraper operations . . . put power at point of action . . . give faster, more accurate control. Gear shift lever, foot brake and accelerator complete simple control system. Operators can be trained in a few hours.



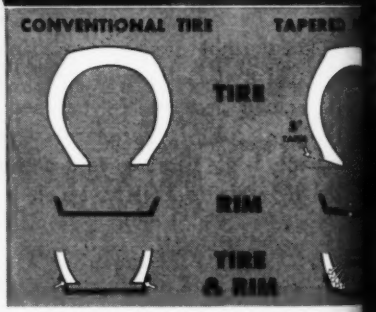
Revolutionary Tournamatic differential and powerful final drive keep "D" rolling through mudholes or over slippery grades where other units stall. Result: less weather downtime, longer work season, more roadbed serviced, lower cost maintenance.

3 TO 4 TIMES FASTER THAN CRAWLER RIGS!

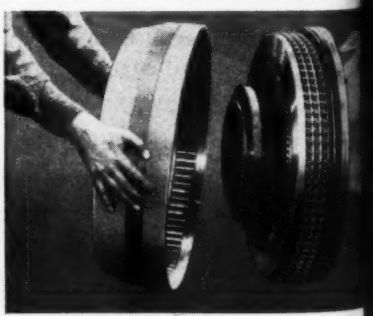
Careful selection of off-track tools pay off in holding down costs on right-of-way maintenance. D Roadster Tournapull, LeTourneau's 28 m.p.h., 9-ton capacity "maintenance handyman" gives you a one-man machine that goes anywhere *fast* to maintenance assignments. It handles scraper dirt 3 to 4 times faster than average crawler rigs, self-loads, or can be pusher-loaded for big production on fleet operation. Even more important is its go-anywhere ability . . . via highway, down the track, along the right-of-way. Big tires easily cross rails or curbs without blocking, can drive safely over trestles, across yards, over blacktop, through mud, sand, soft fill where other units bog down.

Here is the best RR maintenance dirtmover ever offered. Gets more jobs done, faster, easier, with less manpower. Eliminates delays in maintenance service, eliminates delays to rail traffic, eliminates headaches of supervision, dispatching and management. Check money-saving applications illustrated, then write for detailed, job-proved performance data on type of work you have in mind.

R. G. LeTOURNEAU, INC.
PEORIA, ILLINOIS



Big 63½" high x 20" wide tires, with normal operating pressures as low as 40 lbs., provide extra flotation in extremely soft going. The 5° taper doubles tire-to-rim grip . . . prevents tire slipping . . . assures long, economical tire life . . . makes retreading practical.



4-wheel air brakes with 719 sq. in. of braking surface per wheel, or total of 2876 sq. in., assure quick, safe, sure stops . . . require minimum maintenance . . . improve maneuverability . . . give operator confidence for faster operation on all footings.

Handles to 7 cu. yds. gravel, ballast, cinders — One-man "D" loads, hauls, and spreads in one operation over long or short distances. Digs from pit or stockpile . . . no big, expensive loading unit or special spreading tools needed. Works any length haul independent of work-train service.

Stockpiles coal, dozes, push-loads other units — With dozer blade on front, "D" eliminates need for odd-job bulldozer . . . stockpiles coal . . . push-loads other "D's" on fleet operation . . . handles emergency dozing . . . backfills trenches . . . pushes dirt around culverts . . . gives help to short-handed section crews.

Crosses tracks, curbs, pavement on job-to-job moves — speeds to job at 28 m.p.h. Dip . . . goes right to work, with no loading delays. Big, soft-cushion 18.00 x 25 tires detect load evenly over obstructions.

SPECIFICATIONS

D Roadster with E-9 Carryall Scraper

- Capacity 9 tons - 7 cu. yds.
- 5 speeds forward to 28 m.p.h., 122 h.p. diesel
- Fingertip electric control
- Positive, power steer
- Heavy-duty transmission, sliding gear type
- 90° turn—min. turning radius 13'
- 4-wheel air brakes, 2876 sq. in. total braking surface
- Overall dimensions — length 27' 3", width 8' 3"
- 18.00 x 25 tapered bead tires
- Weight approx. 22,450 lbs.

Three larger size Tournapulls are also available: 18-ton, 35-ton and 50-ton

Digs, cleans ditches . . . widens embankments—new high-speed method of maintaining ditches, practically eliminates extra finishing. On this job, "D" self-loaded 5 pay yds. top soil, clay, silt in 1 min.

Builds, relocates grades for sidings, spurs, main lines — "D" works on grade or drainage jobs singly, or in fleets, with or without pusher. In slippery going, Tournamatic differential automatically delivers up to 4 times the tractive effort of slipping wheel to wheel on firmer footing.

Tournamatic, Tournapull, Carryall—Trademark Reg. U. S. Pat. Off. 8820

Plows snow in yards, access roads — Easily mounted V-Type Snow Plow changes "D" into efficient snow plow . . . correctly curved blade, plus plenty of power, smashes deep drifts . . . opens yards, sidings, loading tracks, access roads. Scraper can load and haul snow and ice from yards.

Send Now to: **R. G. LeTOURNEAU, INC., Peoria, Illinois** Tell us more about 9-ton, 122 h.p. D Tournapull . . . .

NAME..... TITLE.....

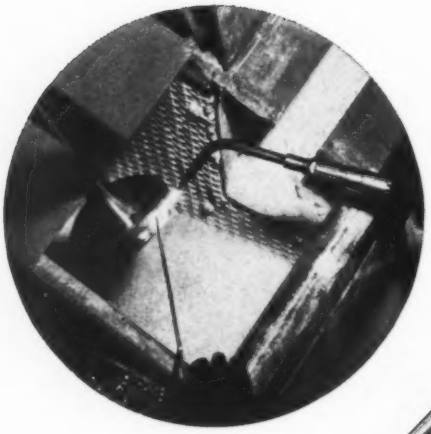
COMPANY.....

STREET..... CITY..... STATE.....

also data on:

- ☐ 18-ton
- ☐ 35-ton
- ☐ 50-ton

LeTOURNEAU LET EQUIPMENT



for
AIRCO'S 800
WELDING
TORCH

no job
too
tough

Airco's versatile 800 torch meets the demands of today's speeded-up railway maintenance schedules. Flame-cleaning . . . brazing . . . hard-facing . . . welding the heaviest sections . . . whatever the work, in the shop or on the road, you can be sure that the "800" will handle it quickly and economically.

For long life, the torch head is made of durable monel. Sturdy brass forgings and seamless brass gas tubes stand up to the roughest handling. All components require little maintenance.

The "800" is unexcelled for brazing, or for straightening and bending operations. A wide range of tips is available. By adding a cutting attachment, the Airco 800 torch can be quickly converted to cut steel from thin sheets up to 6" plate—ideal for the occasional cutting job.

Dependable performance? You're sure of it from the 800 torch, thanks to Airco's 35 years of engineering know-how. Learn about Airco's complete line of arc and oxyacetylene equipment and supplies for railway track work or shop work. Get in touch with your local Airco office today. Representatives will be glad to help you with any welding or cutting problem.

Costs come down under the Airco plan

AIRCO

AIR REDUCTION

AIR REDUCTION SALES COMPANY • AIR REDUCTION MAGNOLIA COMPANY
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REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL
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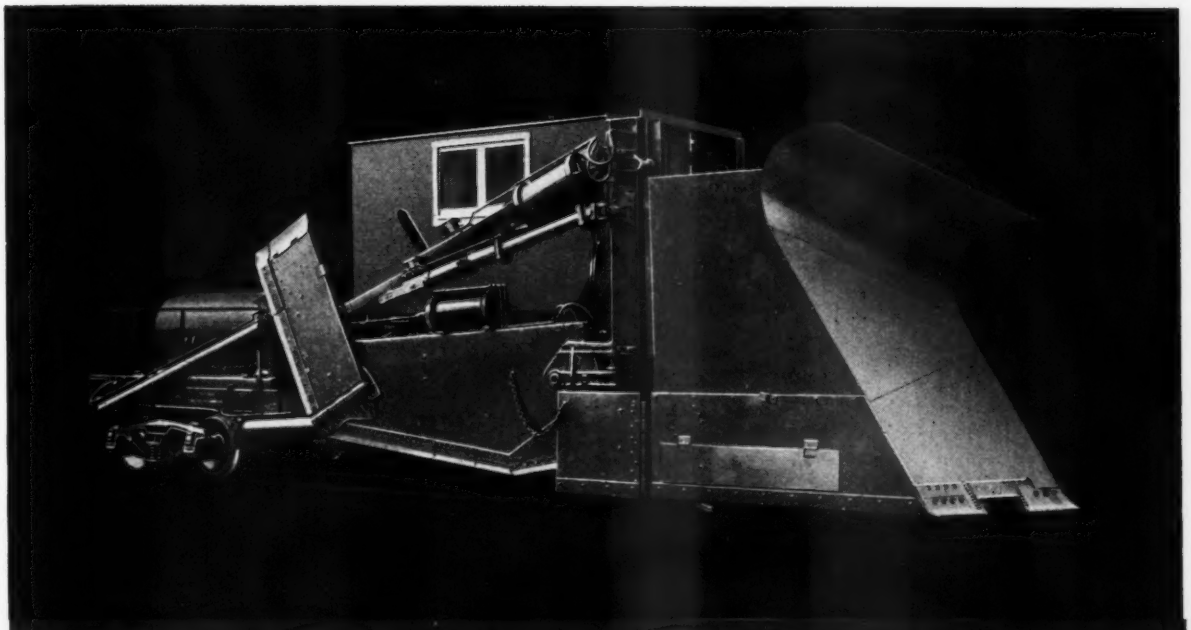
For additional information, use postcard, pages 871-872



Snow Remover Extraordinary

JORDAN SPREADER-DITCHER -SNOWPLOW Standard Type

For keeping vital supply-ways open and traffic moving, the JORDAN Spreader-Ditcher-Snowplow has no superior.

The Jordan flanges and bucks snow in one operation. Its rugged manganese cutting blades rip out the accumulated ice and packed snow below the top of rail.

For quick, efficient snow removal in classification rail yards, for opening snow blocked track, and for plowing snow out of cuts, the JORDAN has no equal—built for either single or double track operation . . .

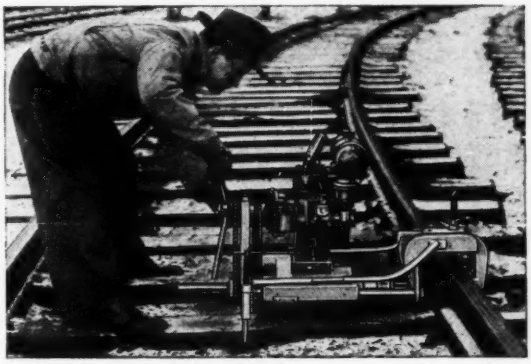
—plus during spring, summer, and fall months the JORDAN is used as a Spreader-Ditcher-Ballast Plow—truly an "all year 'round" maintenance tool.

SERVICE MORE TRACK IN LESS TIME FOR LESS MONEY - -

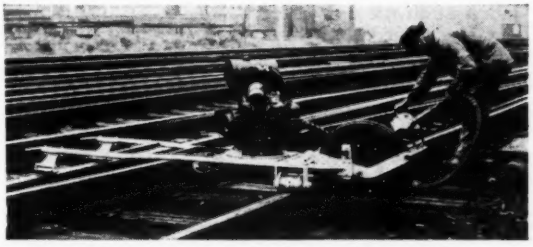
WITH SPEEDY, EASY-OPERATING RTW DRILLS AND GRINDERS

Low-cost low manpower RTW Drills and Grinders speed up your maintenance work . . . enable you to keep rails shipshape without crowding your track gangs . . . and save you money to boot!

Two popular RTW maintenance machines are shown below—others available also give you labor-saving advantages at substantial savings.



RTW'S MODEL P-43 POWER TRACK DRILL gives you 60-second drilling . . . quick, accurate drill-leveling . . . easy-acting, easily-controlled screw feed . . . easy-handling (aluminum castings keep weight down to 125-lbs.) . . . quick on/and/off-rail action . . . chuck jaws that take beaded bits up to 1½" and automatically stay open when chuck is loosened.



RTW'S MODEL P-44 PORTABLE FLEXIBLE SHAFT GRINDER is designed to give you added savings in labor and costs when you lay new track or repair old.

Grinder's 360° swivel engine mount prevents short bends and kinking of flexible shaft . . . clutch assembly in the engine protects shaft from overload . . . three position wheel clears switches and crossovers easily . . . light and compact, it gets on and off the track fast . . . quickly adaptable for auxiliary equipment: Straight Wheel Hand Piece, Angle Hand Piece for Cup Wheel, Cross Grinder Guide and Track Drill.

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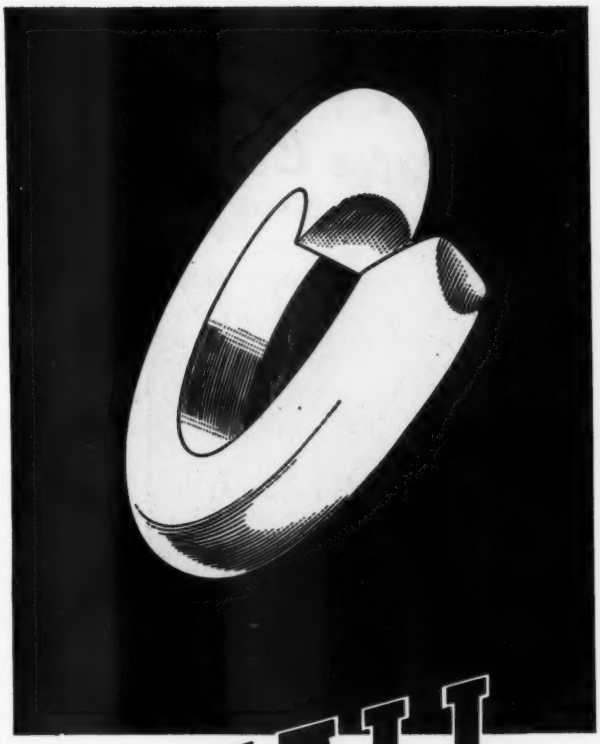

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BEALL Hi-Duty Spring Washers are made especially to stand the strain of the heavy-duty rail service required by today's high-speed freight and passenger trains.

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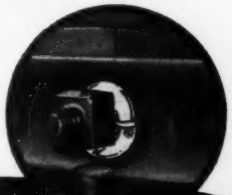


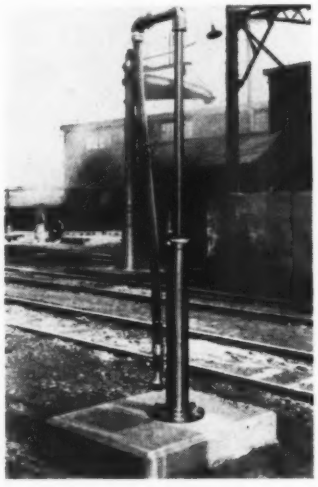
BEALL TOOL COMPANY
Div. of Hubbard & Company
EAST ALTON, ILLINOIS

Made Especially for Railroad Service

POAGE

Water Columns

for servicing Diesel locomotives



The POAGE DIESEL COLUMN, type No. 33, is designed with the following features to facilitate the servicing of Diesel locomotives: (1) The Poage Water Hammer Eliminator is incorporated in the valve chamber mechanism, preventing any damaging water hammer in the supply line after the valve is shut off. (2) The vertical column is self-draining immediately after use, eliminating the need for frost boxes. (3) The Poage Diesel Water Column has been operated in subzero temperatures with continuous satisfactory service.

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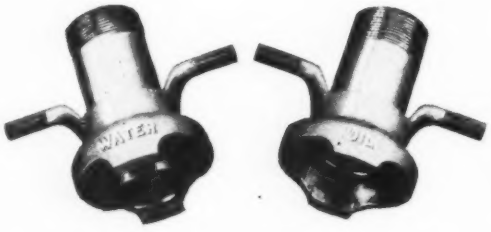
Water and Oil Couplings

for servicing Diesel locomotives



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ARE MASTERS OF ALL!

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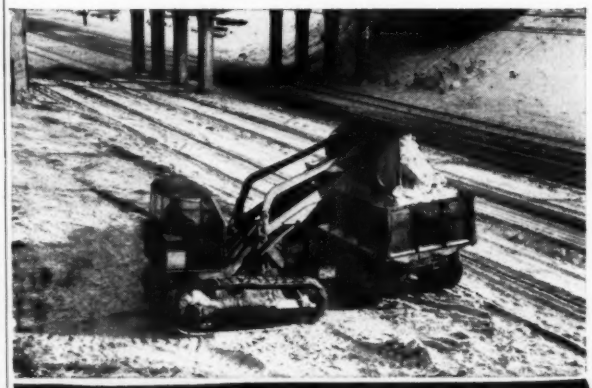
With such an unlimited range of railroad applications, TRAXCAVATORS are never idle. They work the year 'round, with low-cost, efficient performance.

Let your nearby TRACKSON-CATERPILLAR Dealer show you the TRAXCAVATOR (there are five models from ½ to 4 cubic yard capacity) that can handle your off-track tasks . . . or write TRACKSON COMPANY, Dept. RE-101, Milwaukee 1, Wisconsin.



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CONSIDER THESE POINTS WHEN PLANNING YOUR

1952

WEED and BRUSH CONTROL PROGRAM

1. No *one type* of WEED KILLER or BRUSH KILLER will take care of all roadbed or right of way growth.

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THE SAME Fabco Tie Pad is now available with a thoroughly proven self-sealing coat on one side to bond pads to ties, thereby keeping out moisture and dirt . . . Applied to Fabco tie pads before shipment, it consists of a 1/16" coat of sealing compound on the side of the pad next to the tie. Since the tie plates tend to move under traffic, it is not advisable to bond the pad to the plate, but leave the plate free to move, — greatly reducing any tendency to break the seal between the bottom of the pad and the tie . . . Same standard and special sizes as unsealed Fabco Tie Pads, but 5/16" thick instead of 1/4".

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FABCO *Self Sealing* TIE PADS are as easy to install as regular FABCO TIE PADS.

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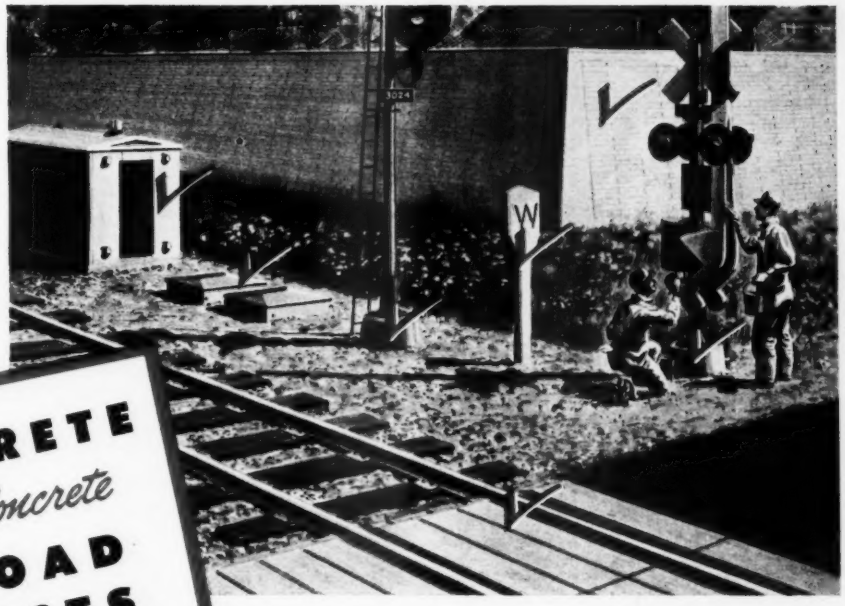
Check the permanence, superior performance, and lower in-place cost of these sectional concrete products when planning your '52 budget.



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BATTERY BOXES Five light weight steel reinforced concrete sections, complete with slat bottoms, terminal boards, insulation, frost cover and steel cover. Sizes 12665, 12666, 12667, 12668. Also one piece Air Cell and Track Circuit boxes.

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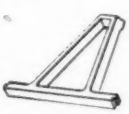
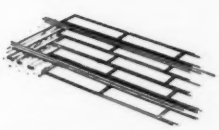
FOUNDATIONS


CRIBBING


BOOTHS


HOUSES


CROSSING SLABS


BATTERY BOXES


POSTS

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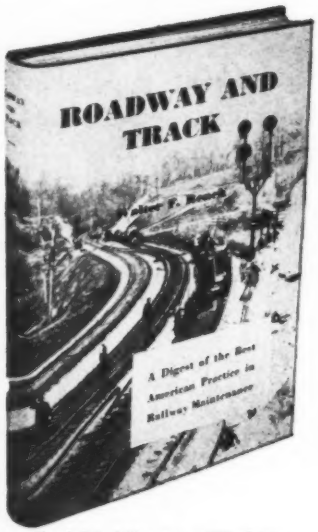
A Handbook of
Modern Track Work

ROADWAY AND TRACK

By Walter F. Rench
Formerly Supervisor on the Pennsylvania Railroad;
Author of Simplified Curve and Switch Work



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The third edition features the use of the latest mechanical equipment in connection with roadway and track maintenance. Older methods employed where full mechanical equipment is not available are also explained. While most of the methods described are those which are standard on the **Pennsylvania**, A.R.E.A. recommended practices and those in use on other well maintained roads have also been included.

Outstanding types of mechanical equipment used in track work are described and illustrated with action photographs. Engineering drawings show working details. The economies resulting from the adoption of modern methods are clearly outlined. Useful tables have been added to make the book suitable for reference use, as well as a practical handbook on modern methods.

CONTENTS

Part I—ROADWAY: Essential Elements in Roadway Maintenance—The Right of Way—Drainage of Roadbed and Track—Vegetation for Banks—Economics of Roadway Machines—Labor Saving Methods and Devices in Roadway Work—Small Tools and Their Uses.

Part II—TRACK: Essential Elements in Maintenance of Track—Program for Maintenance of Way and Structures Work—The Track Obstruction—Power Machines and Equipment—Labor Saving Methods in Track Work—Track Materials and Their Uses—Practice in Rail Renewals—Practice in Rail Repair and Inspection—Maintenance of Main Tracks—Maintenance of Yards and Terminals.

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SUPPLEMENT: A 10-page Supplement describing new A.R.E.A. recommendations and changes up to July 1, 1948, can be cut for insertion in proper place.

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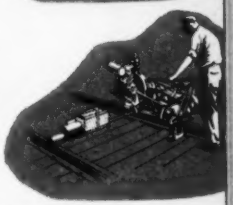

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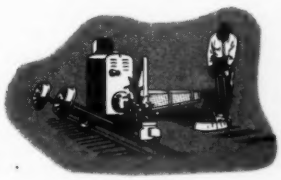

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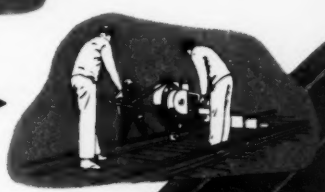

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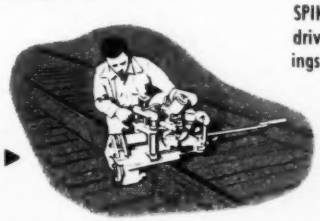

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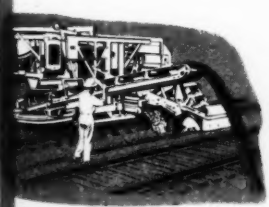
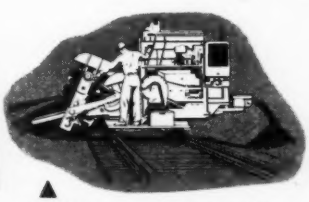
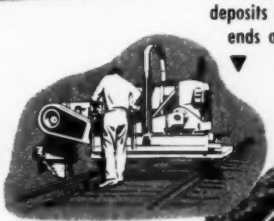


SCREENEX . . . Takes excavated fouled ballast fed by BALLASTEX, screens it, and returns clean ballast to track, intertrack, or shoulder.

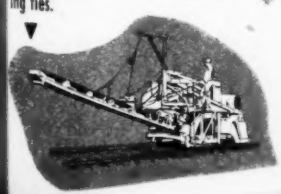


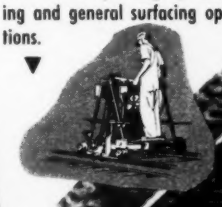
BALLASTEX . . . Excavates the ballast in area between tracks or in shoulder. Disposes of it by wasting or by feeding to SCREENEX for cleaning.



DSL YARD CLEANER . . . Cleans more track faster, better, more economically . . . without damaging ties.

POWER JACK . . . Maintains alignment while speeding up ballasting and general surfacing operations.





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to do a Better, Faster Maintenance Job at Lower Cost

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Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

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Subject: Competing for Your Time

October 1, 1951

Dear Readers:

Never before has the average man had a greater selection of things to do during his "spare" time than he has today. The effect of television on the leisure-time habits of millions of people has been revolutionary. To counteract this effect, and to get their share of John Q. Public's money and time, publishers of popular periodicals are producing better, more colorful and more stimulating magazines, and there are more of them. Also in self-defense, Hollywood is making an effort, with some success, to produce moving pictures of such caliber as to wean the public away from its television sets and back into the theaters. At the same time, outdoor sports, hobbies, organization work, and a host of other diversions, continue to absorb a generous share of the average person's spare time.

The editors of this magazine are acutely aware of these increasing demands on your leisure time. While many of you receive your copies of Maintenance at the office, we know that most of you have time only at night to read it in detail. It is because we fully realize the "pulling power" of the other agencies competing for your time that we have made so many improvements in our magazine. Articles that are more concisely written and have more and better illustrations, attractively arranged, are among these improvements.

It must be realized however, that there is a sharp line of distinction between trade magazines and other agencies that compete for your off-the-job time. Television, radio, movies, hobbies, sports, and popular magazines are all forms of recreation. Their primary purpose is to permit viewers or participants to "escape" for a few minutes or hours from business, personal or other problems. In the ordinary sense a trade magazine is not a form of recreation; it is a medium for bringing you information designed to help you keep abreast of developments in your field of business, and generally to do a better job.

Although there are ways of enhancing the attractiveness and readability of trade magazines there is no way in which they can be given the same recreational appeal as is possessed by television, moving pictures or popular fiction. It is for this reason that the man who desires to make progress in business will want to organize his spare-time activities to allow an adequate amount of time for reading his trade magazine or other educational material.

Yours sincerely,

Merwin H. Dick

MHD:ag

Editor

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Fig. 3911
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(Patented)

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Essential to the safe operation of these trains, facing point switches must be secured in a closed position, regardless of failure or damage to the throwing mechanism. Racor Switch Point Locks can be installed with all designs of main line switch stands. Ruggedly designed — easily installed below top of ties as protection against damage, they function independently of stand.

Fig. 3911 (illustrated) for use with all types of column throw stands.

Fig. 3912 available for use with all types of ground throw stands.

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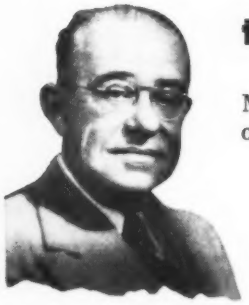
VOL. 47, NO. 10 OCTOBER, 1951

for track at its level best!

... at the Lowest Cost

Working for the Jersey Central—the Pullman-Standard Power Ballaster, with J. W. Rementer, Track Supervisor, Mauch Chunk, Pa.

Take it from the Jersey Central



this Power Ballaster's doing a job!

Mr. J. W. Rementer has summed it up, from his own observation and from careful records of performance on the Jersey Central. Read what he says:

> **"We use Pullman-Standard Power Ballasters because we have found them to be most efficient. Especially important is their ability to tamp all types of ballast, *from cinders to large traprock,* and to give *full compaction* while maintaining a *very high production rate.* We find that the Power Ballaster can handle a surface-smoothing job or a high lift with equal facility."**

Studies of Power Ballaster performance on the Jersey Central are available to show the conclusive type of evidence on which Mr. Rementer's verdict is based. Operating records made on other railroads are also on open file. The Pullman-Standard representative will be glad to show you this comprehensive data.

You should see it. We believe it will convince you that, no matter what tamping job you may want to do, the Power Ballaster will do it better, at lower cost, than any other tamper in existence today.

POWER BALLASTER PRODUCTS DIVISION

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Observations—

On the Roadmasters' and B. & B. Meetings

While the annual conventions of the Roadmasters' and Bridge and Building Associations are still fresh in the minds of those who attended them it might be profitable to appraise the meetings from the standpoint of their effectiveness in promoting sound maintenance practices. To begin with, however, it should be emphasized that such an evaluation could not in any sense be termed a post-mortem, because there could be no doubt in the mind of an observer at the meetings that the sponsoring associations are very much alive and that they are playing, and will continue to play, a vital role in helping the railroads to solve their maintenance problems.

Although the consideration of technical problems was, as usual, carried out largely by means of committee reports, there were a number of open-forum and round-table discussions of subjects of current interest. Such devices are widely recognized as effective means of giving any subject a thorough airing. By bringing into the discussion several persons with different ideas and different ways of expressing themselves, they are generally more effective in holding the interest of the audience, and in developing the various facets of a subject, than would be a discussion of comparable length by a single person. Possibly the Executive and Program committees of the two associations will wish to make more frequent use of the panel-of-experts device when planning the programs of future meetings.

Registration at the meetings, although not quite as high as last year, was eminently satisfactory, particularly in view of the absence this year of an exhibition of manufacturers' products. The fact that attendance in the meeting rooms was unusually good, coupled with what seemed to be an extraordinarily intent attitude on the part of the audience, leads to the conclusion that maintenance men generally are keenly aware of the gravity of the problems facing them, and are anxious to take advantage of every opportunity to improve their ability to deal with these problems. Although the amount of discussion from the floor was relatively satisfactory, its value would have been enhanced by a wider participation on the part of those present. Also, since most of the speakers from the floor addressed their remarks to the chairmen and usually spoke in low tones, their comments were largely unintelligible to persons seated in the rear, especially in the Roadmasters' meeting room which was the larger. This situation could be remedied if floor speakers were requested to face the audience and to raise their voices.

There is no question but that the two conventions were highly successful, but it is well to emphasize that their success was made possible only because of months of careful planning and hard work on the part of the officers and standing committees of the two groups, and the many hours of midnight oil that must have been burned by the technical committees, especially the chairmen, in preparing their reports. Because of the unflagging devotion and industry which have been applied to the handling of the affairs of the two associations over the years their standing in the eyes of railway management is now higher than ever before.

Track and B. & B. supervisory officers, if they do not already belong to one or the other of these associations, will find membership in them a highly rewarding experience.

WEED ERADICATION—

Methods Advancing Faster Than Costs

ONE HAD to sit through no more than the reading of the first committee report presented at the recent convention of the Roadmasters' and Maintenance of Way Association to be forcibly awakened to the great forward strides that both maintenance men and railway suppliers have made in the last two decades. Published in full in the following pages, along with all the other reports presented at this convention, that report dealt primarily with the economies derived from the use of weed eradicators, but carried with it an implication that the progress made in weed-killing methods and materials paralleled similar progress made in carrying out other maintenance work.

Specifically, what progress has there been in weed-killing methods? Probably the best way to answer that question is to compare some of the facts stated in the report referred to with an article entitled, Is Weed Killing Worth While?, presented in this magazine in June 1933. That article has been referred to time and again by railway men and representatives of supply companies in the weed killer field.

The 1933 article stated that for more than three-quarters of a century weed eradication was a hand operation. Next it was done by shovels and then by scuffle hoes. Even with the low wages that then prevailed, the cost of a single weeding was $80 to $100 per mile. At that cost, it could seldom be done anywhere but in the ballast area. By 1933 only a few roads were still using hand methods. Other methods employed included chemical treatment, burning, steaming, disking, mowing, etc.

Because most of the progress that has been made since then has been in the field of chemical treatment let's compare the cost of the methods used then with those in use today. In 1933, chemical treatments were applied only to the area previously cleared by hand—the ballast area or slightly beyond it. The cost of treating that small area alone ranged from $9 to $46 per mile per year, or on the average of $23 for the 15 roads reporting.

According to the Roadmasters' committee report presented this year, "some roads spend as little as $19 per mile for a single spraying of chemicals, while others spend as much as $85 to $90 for one to three sprayings" for a much wider area. To spray an entire 100-ft. right of way, the report states, it cost one road only $214 per mile.

When it is considered that between 1933 and 1950 wage rates rose more than 350 per cent, the present costs for a much more extensive and effective job of killing weeds are phenominally low. Furthermore, it is to be expected that even greater economies and more effective results can be expected from a study of weed-killing methods that is being sponsored by the American Railway Engineering Association.

SUPERVISORS—

Still Have a Selling Job to Do

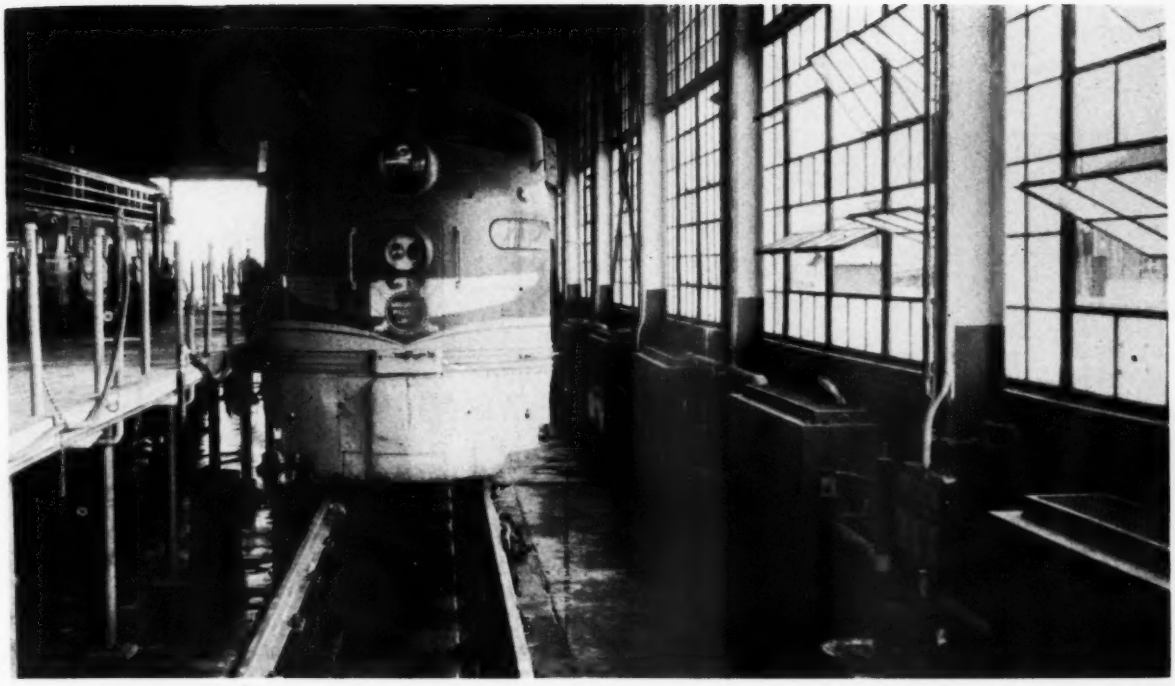
WHEN it comes to selling an idea that will produce beneficial or profitable results, many engineers are outstanding in their sales ability and arguments. For this reason it is difficult to understand why it is that sound ideas for promoting economies in maintenance have not always been successfully "sold" to railroad managements.

One of these ideas is the matter of detouring trains around large rail-laying, ballasting or maintenance gangs in multiple-track territory. There are still operating departments on some roads that insist that trains operate normally on their usual tracks and that on-track machines be removed from the rails to permit traffic to pass.

Where these conditions exist, it would seem that someone has failed to do a proper selling job. Even a 50-man gang will involve an outlay of more than $600 an hour at the prevailing cost of labor, supervision and equipment. Hence, to stop the work of such a gang for 20 min. for each train interruption will cost the maintenance department $200 for non-productive time. Obviously, gangs of 75, 90, 100 and 125 men cost proportionately more in lost dollars for similar interruptions. By multiplying the cost of one train interruption by the number of trains interfering with a gang's output, it will usually be found that the installation of facing-point and trailing-point crossovers some distance on each side of the gang will result in handsome savings to the railroad. Moreover, the turnout material so used is not a dead loss either because it can be recovered in a relatively new condition and re-used elsewhere.

Another case in point is the "penny-wise, pound-foolish" attitude relative to the development of deferred maintenance in the tracks and structures that continues to prevail in some quarters. Railway managements must be "sold" on the idea that undue delay in painting bridges and buildings, in cleaning ballast, and in carrying out similar items of maintenance work, is very likely to result in excessive costs over the long term.

These uneconomic practices will continue as long as the responsible maintenance officers suffer them to do so. Although it is certain that these officers are well aware of what ought to be done, it is equally certain that a more concentrated sales effort must be made if the situation is to be corrected.



The special heating units along wall at the right take fresh air through the wall from the outside when the coordinated roof exhaust ventilators are discharging, and recirculate the air within the building when roof exhaust ventilators are closed

Installs Special Units to Satisfy Heating Needs of Diesel Shops

Where it is necessary to discharge air from a shop for ventilation no heating system can be truly economical. But the Missouri Pacific believes that the heating-and-ventilating systems it devised for two of its diesel shops come as close to the ideal as conditions will permit.

• What is the best way to heat a new diesel shop? How can the locomotive exhaust gases be removed without the heat being dissipated in warming "all outdoors?" And what heating systems will serve this purpose satisfactorily and still be relatively economical to operate? These and other questions were considered before the Missouri Pacific constructed new diesel shops at St. Louis, Mo., and at Osawatomie, Kan., last year. Simply stated, the road's solution to this complex problem was to devise a system for capturing and removing the exhaust fumes at the roof level, and for introducing heated air near the floor level. To incorporate a heating-and-ventilating system of this type, it was necessary to develop heating units of a special design, which were interconnected electrically for their coordination with corresponding roof exhaust units, and to use the pedestal open-type pit construction throughout the shop for the support of the tracks.

Inasmuch as the exhaust fumes from a diesel locomotive are heavier than air, the railroad realized that gravity-type roof ventilators would be ineffective. Also, allowing the fumes to drop to the floor level would be objectionable because the concentration of the gases would center around the working areas and would also set up violent drafts of cold air in these zones during winter months.

It was noted that some railroads had tried lowering a small hood over the diesel exhaust ports of locomotives in the shop. One objection to this method of exhaust was that these hoods, spotted overhead at close intervals, with their relatively large flexible connections, interfere with the operation of overhead cranes. Another objection was that, if a diesel locomotive is inadvertently moved without disconnecting the hood on top of the engine, serious damage to the exhaust system can result. Moreover, when the exhaust ports of all the various types of diesel locomotives that are used by the Missouri Pacific were plotted on a

plan of the shop in the various combinations that might prevail, it showed that an almost continuous hood, with a complicated means of mechanical air exhaustion, would be required—an impracticable solution. These considerations led the road to the adoption of power roof exhaust units to remove the gases before they become sufficiently cool to drop to the floor.

Another feature that the M.P. desired to have in its heating-and-ventilating systems was an arrangement whereby, when a certain amount of warm air was removed along with the locomotive exhaust fumes through the roof, an equivalent amount of heated air would be introduced into the building at working levels. This stipulation meant that some sort of interconnection of controls for the exhaust units and the heating units would be necessary. Also, the railroad wanted the heating system to function normally when no air was being exhausted through the roof, which indicated the recirculation of air within the building.

Use Fan-Type Exhaust Units

As installed in the diesel shops at St. Louis and Osawatomie, 12,000-c.f.m. fan-type power exhaust units have been placed at strategic locations on the roofs. Baffle boards, placed parallel with the length of the building and between tracks, were installed under the roof to form pockets for confining the exhaust gases so that the roof exhaust units could more easily remove the fumes. In computing the number and size of these exhaust units, the railroad used a unit of 16,000 c.f.m. of fresh air per 1,000 locomotive horsepower. To make up for the air exhausted, special ventilating heaters, heated by steam from the terminal's high-pressure steam line, were located along the inside faces of the side walls as close as posssible to the corresponding overhead roof exhaust unit. The discharge from the ventilating heaters has been kept within 24 in. of the floor so that warm air will pass beneath any diesel locomotive that happens to be standing alongside of the heater. With the open-pit construction, consisting of 155-lb. rails supported on columns of wide-flanged beams, spaced 4 ft. 10½ in. apart, there are no obstructions to the free movement of the heated air in a horizontal direction.

The open-type pit construction permits warm air from the heaters to pass beneath a diesel locomotive and to move freely across the building at the floor level

When one of the power exhaust units in the roof goes into operation, its nearby ventilating heater also is caused to operate, and an equal quantity of air, heated to 90 deg., is introduced at the floor level, beneath any diesel locomotives that may be present in the shop. The warm air naturally tends to rise on both sides of each locomotive and presently is caught in the suction of the roof exhaust fan after the latter has picked up the discharge from the exhaust ports of the locomotive.

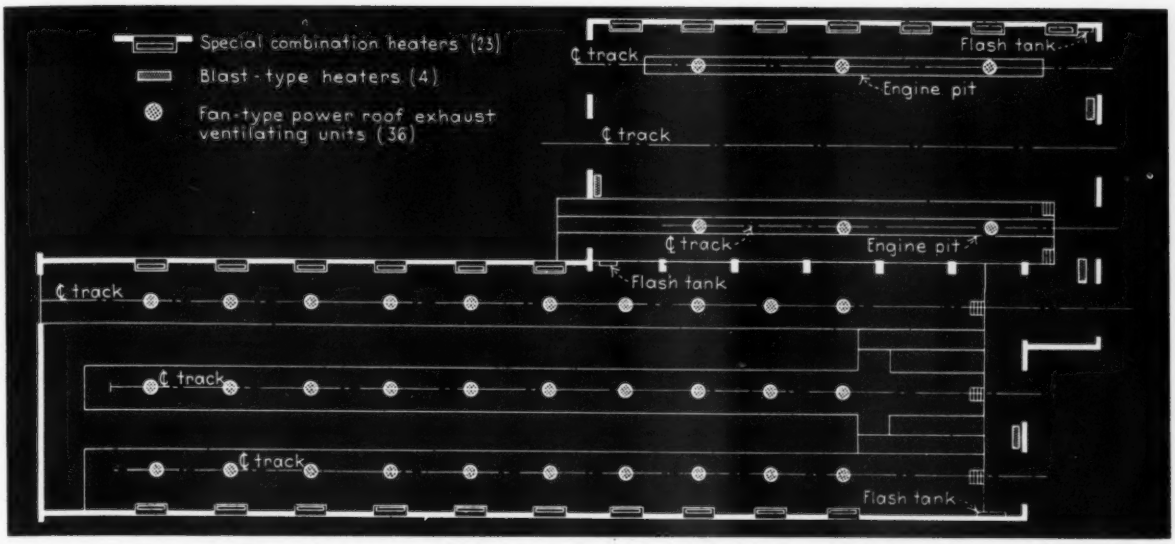
During the winter, it has been found that 90-deg. air at velocities up to 1,000 ft. per min. creates a pleasant sensation as it comes in contact with the feet and legs. Likewise in the summer, when steam is no longer furnished to the ventilating heaters, the outside air, as introduced through the ventilating units, is agreeable to personnel and still effective in "pushing" diesel gases from the building.

The special ventilating heating units are constructed of No. 14-gauge steel with angle reinforcement, and are 8 ft. 11 in. long, 24 in. wide, and 6 ft. 10½ in. high. The principal elements of each of them is an intake plenum, 24 in. high, in the top, fin-type heating coils, four blowers on a common shaft, and a 24-in. discharge plenum at floor level, with directional vanes and adjustable louvres. A bracket-supported electric motor is located on one side of the unit and drives the blower shaft by means of a V-belt.

The intake plenum is equipped with fresh-air dampers on the back, and is connected with identical dampers for recirculated air on the top. Dampers are set by means of a two-position damper motor so that the unit either takes in fresh air through the back via louvres set in the outside wall, or recirculated air through the top as it settles down along the glazed wall of the building above the heater.

The heating coil of the unit utilizes steam at 35 p.s.i. The steam connection is on one side of the heater and a condensate connection is on the other side. These coils are rated at 995,000 B.t.u. per hour and are supplied with steam regardless of the immediate heating or ventilating needs of the building. A bucket trap with an integral vertical check valve receives the condensate which is forced through the return line by steam pressure. Air is removed from the condensate connections at the heater by means of an automatic air valve.

Face and by-pass dampers have been placed directly below the heating coils and are interconnected. By means of a modulating damper motor, the temperature of the air at the outlet is maintained at a maximum regardless of the intake air temperature. It is desirable to keep this outlet air at a temperature of 90 deg. F.; however, when outside temperatures infrequently drop below 10 deg., the outlet temperature from the



Plan of the Missouri Pacific's diesel shop at St. Louis, Mo., showing the arrangement of the power exhaust ventilators in the roof, the special combination heaters and air-tempering units, and the blast-type unit heaters over the outside doors

heater may drop slightly below 90 deg.

The four blowers on each shaft are each 13 in. in diameter, turn at 800 r.p.m. and handle 12,000 c.f.m. of air, which is the same amount as is exhausted by each of the roof units. The blowers are operated by a 3-hp. 220/440-voit, 3-phase electric motor which is protected by a suitable guard. The blower shaft, 1 7/16 in. in diameter, is supported at the center and at both ends of the heater.

The outlet plenum of the heater receives air from the top and throws it out along the floor with an outlet velocity of 860 ft. per min. It is entirely protected from the front by an expanded metal guard, behind which are adjustable vertical louvres.

How System Operates

When the heater is operated for ventilation purposes, action is started when one of the 12,000-c.f.m. roof exhaust fans is energized. The motor operating the motors for fresh and recirculated air is in the same series as the exhaust fan and, through transformed 24-volt current, the fresh air damper is opened and the recirculated air damper is closed. At the same time, an auxiliary switch on the damper motor arm starts the 12,000-c.f.m. blower motor. Whenever the roof ventilator is shut down, the damper in the ventilator-heater unit goes back to the recirculated-air position (its normal position) through a spring action, and the blower motor is stopped by the auxiliary switch. No attempt at automatic control of the steam to the coils is made.

When the heater is operated for heating purposes, the 12,000-c.f.m. blower is set in operation manually through a magnetic starting switch. The fresh air-recirculated air dampers remain in the spring-held normal position, i.e., open to recirculation and closed to fresh air. Should fresh air be called for while the unit is operating for heating purposes, the fresh air-recirculated air dampers merely open to the fresh-air position and stay there until the roof exhaust fan stops and the spring damper motor goes back to the normal heating position. The blower motor continues to operate during this cycle.

The face and by-pass damper just below the steam coils is not directly affected by a change from fresh air to recirculated air. However, when colder air enters the unit, the face damper opens wider to pass more air across the steam coil and to maintain the outlet temperature at 90 deg. Conversely, when warmer air comes in contact with the steam coil, the by-pass damper opens wider, by means of its 24-volt modulating damper motor, to maintain a constant outlet temperature.

At the St. Louis diesel shop, 23 special ventilating heaters and 4 blast-type unit heaters were used. The four blast type unit heaters were used over the doors at the ends of the shop building. A total of 36 fan-type power exhaust units was used in the roof.

Three flash tanks were installed in the system in the St. Louis shop to make further use of the heat from the steam furnished to the ventilating-type heaters, and to prevent steam from being introduced into the vacuum return line running to the power plant. Such steam would reduce the capacity of the return line and the pumps in the power plant. These flash tanks act as a trap for the condensate from the steam line, but a steam pressure of 2 p.s.i. is maintained in each tank. This allows a portion of the condensate to return to steam which is used to supply the blast heaters above the shop doors. To assure that the needs of the above-door heaters are met, a pressure-reducing valve cuts in when necessary with reduced high-pressure steam to replenish the supply to the heaters.

The flash tanks and all supply and return pipe lines, with the exception of the vacuum returns from the flash tanks and from the above-door heaters, are insulated.

The heating-and-ventilating systems described in this article, having been completed in the summer of 1950, have been in service one winter during which, it is reported, they gave satisfactory results. The systems were designed and installed under the general direction of A. L. Becker, engineer of structures of the Missouri Pacific.

Constructed by the High Point, Thomasville & Denton as an aid to shippers, this dock, of simple design, has a concrete slab . . .

How to Build a "Neat"

Unsightliness usually characterizes tracks and facilities provided for the loading of scrap into gondolas. However, this article tells how a good-looking, low-cost and, above all, serviceable loading dock was constructed by a prominent short-line railroad utilizing scrap rail in place of structural shapes or wood.

• In accordance with its motto—"Nothing But Service To Sell"—the High Point, Thomasville & Denton, as an aid to shippers in loading scrap iron and other bulk commodities into gondolas directly from dump trucks, has constructed, on one of its team tracks in High Point, N. C., a convenient, neat-appearing, loading dock.

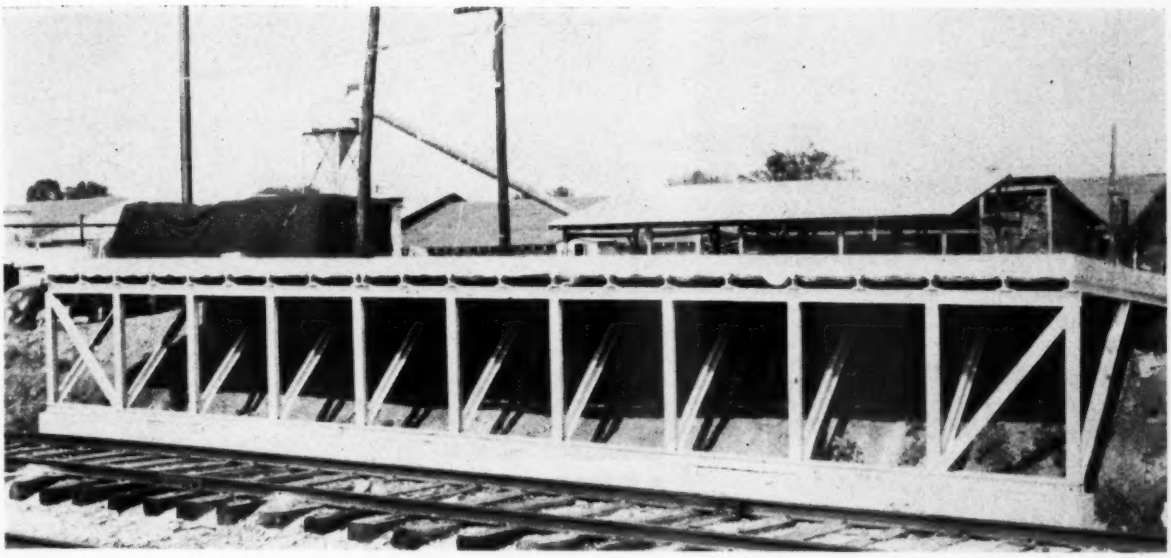
With structural steel unavailable, this dock has a concrete-slab floor supported on floorbeams and columns fashioned from scrap rail of light section. Of simple design, the structure required only 250 man-hours to construct. The steel was fabricated by welding and the concrete was poured in place.

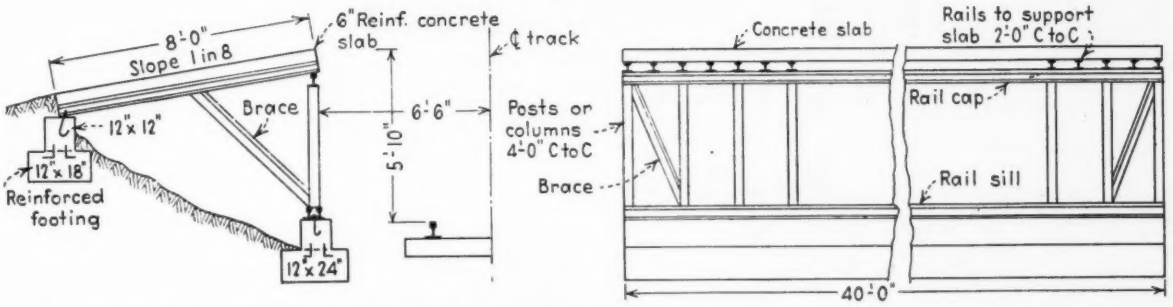
Fortunately an ideal team-track location was available in a cut, the top of which was about six feet above the top of rail. This factor not only reduced the cost of constructing the dock but simplified the problem of building the approach road.

Constructing the Dock

In constructing the dock, two T-shaped, reinforced-concrete footings were first poured parallel to the track, one near the track with its top at the elevation of the top of rail, and the other near the top of cut, as shown on accompanying drawing. Both footings were reinforced and in the bottom one was incorporated a row of anchor bolts to secure a sill laid longitudinally on it. This sill was constructed of two parallel rails, one laid on each side of the row of anchor bolts. The use of two rails for the sill allowed an adequate spread of the load and provided the required amount of surface for welding the vertical members.

To secure the sill rail to the footing, small plates or clips approximately 2 in. by 4 in. by ½ in., were fitted over the anchor bolts and the nuts were run up tight, clamping the rails to the concrete. For added security, the clips were





. . . floor supported on floorbeams and columns fashioned from scrap rail of a light section. Details are given in the drawing

Scrap-Loading Dock

welded to the bases of the parallel rails.

The posts or vertical members, cut to the length required to give the desired height to the dock, were then welded at four-foot intervals on top of the rail sill, with the base of rail on the outside to give a neater appearance. A single rail was welded, workwise, to the tops of the posts to act as a cap for supporting the outer ends of the floorbeams. These beams consist of rails placed on approximately two-foot centers and extending from the cap to the rear foundation. The spacing of the floorbeams is such that one is placed over each post and one midway between adjacent posts. Diagonal braces extend from the lower end of each vertical member to the midpoint of the floorbeam over it, each end being welded in place. Other braces are also welded between the tops of the end posts and the bottoms of the adjacent posts.

Anchoring the Floor

To anchor the concrete-slab floor to the rail floorbeams or joists, studs consisting of scrap bolts, rods or similar steel objects were welded to the tops of the rails. These studs extend about three inches above the tops of the rails and were placed in a symmetrical but not uniform pattern. For instance, two may be fastened to one rail, one on the next and two on the third, etc. All rail used in fabricating the structure was cut to size in the field by oxyacetylene torches and fabricated by electric arc welding.

On the dock constructed at High Point, no forms were used to support the floor slab as it was poured. Instead, metal lath similar to that used in concrete floor construction was used. The use of this forming material eliminated the need for constructing wood forms and later removing them. After the forming lath was in place on the joists, a 6-in. concrete slab, adequately reinforced, was poured, using 1-2-4 concrete obtained from a ready-mixed plant. To keep the fresh concrete from running through the lath, a dry mix was used, thereby avoiding waste and the problem of cleaning concrete off the steel beneath the structure.

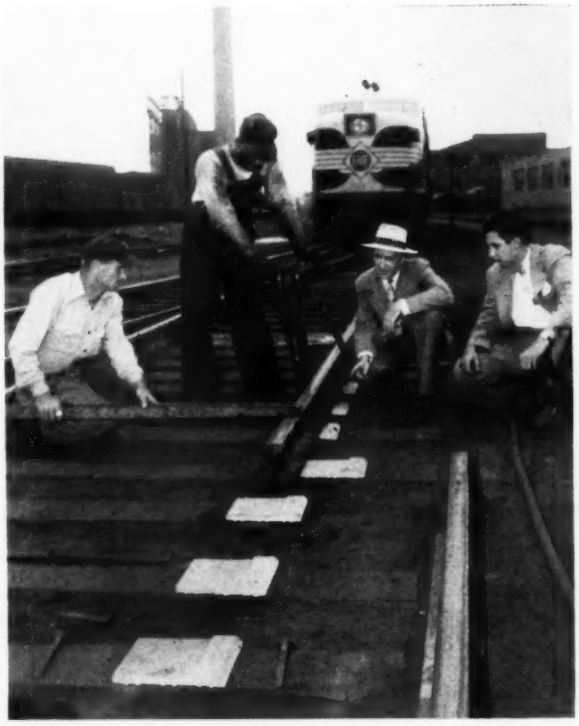
After cleaning the steel and coating it with red lead, the entire structure was painted with aluminum paint, giving it a neat appearance in contrast to the forbidding sight of the usual type of scrap-loading dock.

BEFORE Back in 1888 when it was constructed, the Burlington's original combination office and passenger station at Ottumwa, Iowa, was undoubtedly considered a thing of beauty, but to modern eyes it appeared antiquated and unattractive. Consequently, the road decided to give the building a complete "going over", both inside and out, even though it was adequate enough

AFTER The reconstruction work effected such a remarkable transformation in the appearance of the building that it is now considered by Ottumwa residents as one of the show places of the city. The exterior was given simple, functional lines by removing the gabled roof, by providing new windows and doors, and by covering the outside walls with a 4-in. veneer of Lannon stone. In the waiting room the walls are covered with imported Italian marble, the floor is finished with terrazo, and the ceiling with accoustical tile. Exposed woodwork is walnut

News Briefs in Pictures

OFFICES WITHOUT WINDOWS is one of the striking features of the new general office building (above) which the Toledo, Peoria & Western has built adjacent to its yards and shops at Peoria, Ill. Purpose in omitting windows was not just to make this building different but to achieve correct lighting, uniform temperature, and economical heating. As shown below, live plants were used to divide an aisle from the general office, thus giving the area something of an outdoor atmosphere



SERVICE TEST OF PLASTIC TIE PLATES—An investigation to determine the behavior of newly developed plastic tie plates under actual service conditions has been launched by the Erie in collaboration with the Dynakon Corporation, Cleveland, Ohio, a firm of plastics engineers and the manufacturer of the plastic plates. As the basis of this investigation a test installation has been established in a stretch of Erie track at Cleveland. Produced by a cross lamination of glass fiber and plastic binder, the Dynakon plates are claimed by the manufacturer to have the advantages of resilience, a high resistance to corrosion, and light weight. Shown above supervising the test installation are J. S. Parsons (second from right), assistant chief engineer maintenance of way of the Erie, and Harry Raech, Jr. (right), president of the Dynakon Corporation

Roadmasters' Section

Track Men Consider Old and New Problems

Three-day annual convention, held concurrently with that of Bridge and Building group, was packed with committee reports, addresses and open-forum discussions, all on timely subjects

• One of the problems of track-maintenance men is to keep their thinking up to date relative to new developments and procedures in connection with old problems. At the same time they must keep their thinking constantly "tuned" to the new problems that are forever arising, and must be alert to devise ways and means of dealing with these problems. This dual responsibility of the track man was brought out clearly at the sixty-third annual convention of the Roadmasters' and Maintenance of Way Association, held at Chicago on September 17-19, at which, along with consideration of such long-standing problems as weed eradication, the economical handling of ties and the proper care of new rail to increase its service life, attention was also given to such relatively new subjects as the proper operation of work equipment, and the need, because of special conditions now existing, for more effective measures to attract men into railroad service capable of becoming section foremen.

Continuing a practice of several years' standing the Roadmasters' convention was held concurrently at the Stevens hotel with the annual meeting of the American Railway Bridge and Building Association. The two meetings were convened in a joint session on Monday morning, September 17, after which the two groups separated to hold individual sessions. However, they reconvened in another joint session on Tuesday afternoon to hear an address and a discussion on subjects of mutual interest, and to view a motion picture.

The two conventions were attended by a total of 681 railway men and 370 supply men and guests, the aggregate attendance being 1,051 railway men and guests. In 1950 a total of 1,159 persons registered at these two conventions. The somewhat smaller attendance at the 1951 meetings was attributed in large measure to the absence of an exhibit of manufacturers' products. At the 1950 meetings such an exhibit was sponsored by the Track Supply Association and the Bridge and Building Supply Association. At this year's meeting these two supply associations were again hosts to the railroad groups and their families at a banquet on Tuesday evening, which was attended by 1,333 persons.

President Halverson at speakers rostrum

The proceedings of the Roadmasters' convention, including a brief account of the events transpiring during the joint sessions, are reported in this issue. An account of the separate activities of the Bridge and Building Association will appear in the November issue.

Presiding jointly over the combined opening session on Monday morning were C. Halverson, general roadmaster, Great Northern, Willmar, Minn., and president of the Roadmasters' group, and W. A. Huckstep, general building supervisor, Missouri Pacific, St. Louis, Mo., and president of the Bridge and Building Association. All separate sessions of the Roadmasters' meetings were directed by Mr. Halverson, assisted by A. H. Whisler, assistant engineer, Pennsylvania, Philadelphia, Pa., and first vice-president of the association.

Preliminary features of the open-

Convention Pictures

On this and following pages are presented photographs snapped in the Stevens hotel during the Roadmasters' and Bridge & Building conventions. Additional pictures taken during the meetings will appear in the November issue in connection with a detailed report of the Bridge & Building sessions.

Elected at the convention, the new officers of the Roadmasters' Association are . . .

A. H. Whisler
President

R. H. Gilkey
1st Vice-President

F. G. Campbell
2nd Vice-President

E. E. Crowley
Treasurer

ing session included greetings on behalf of the American Railway Engineering Association by President T. A. Blair (chief engineer system, Atchison, Topeka & Santa Fe, Chicago), on behalf of the Track Supply Association by President R. W. Torbert (Oxweld Railroad Service Company), and on behalf of the Bridge and Building Supply Association by President R. R. Clegg (American Lumber & Treating Co.). Mr. Torbert presented a gavel to Mr. Halverson, and Mr. Clegg presented a gavel and a badge of office to Mr. Huckstep. Lewis Thomas (Q & C Co.), secretary of the Track Supply Association, also spoke briefly at the joint opening session, inviting members of the two associations and members of their families to attend the annual banquet on Tuesday evening. A badge of office was also presented to Mr. Halverson by Mr. Thomas.

Mr. Blair, referring to the recent floods that occurred in the Kansas-Missouri area in July, stated that, because of the heavy track construction in vogue today, and the need for providing temporary structures capable of carrying present-day heavy power, the work of reconstruction in such instances is much more difficult than ever before. In spite of these difficulties, he said, the track and bridge officers who supervised the restoration work, organized the efforts of their forces so efficiently and made such effective use of machines that traffic was restored in less time than would have been required in former years.

The principal address at the joint opening session was made by J. H. Aydelott, vice-president, Operations and Maintenance department, Association of American Railroads. Immediately after the close of Mr. Aydelott's address the two associations began their separate sessions.

President Halverson's Remarks

Addressing the first separate session of the Roadmasters' Association, President Halverson expressed the hope that "every member of this association will lend to his employing railroad the loyal support that will assist in maintaining the railroads as the safest, most economical and most dependable form of transportation." He went on to say that the continued rising costs of materials and the wage increases that have been put into effect present a problem for every maintenance supervisory officer, and that these developments, along with the five-day work week, have brought about an increase in the demand for mechanized equipment.

According to Mr. Halverson, cooperation between the railroad men and the supply companies has resulted in continued improvement in track materials, appliances and equipment, and that improvements in methods and machines have made possible greater production in carrying out ballasting and rail-laying operations, ballast cleaning, tie renewals, improvement in drainage, weed eradication, and snow and ice removal. He pointed out that those attending the convention not only had the opportunity of making contacts with fellow members to exchange ideas, but that in some cases such members passed over the lines of neighboring railroads, thereby enabling them to inspect maintenance work on these other roads.

The principal business transacted during the separate sessions of the Roadmasters' meeting consisted of the presentation and consideration of six committee reports.

In addition to the committee reports the Roadmasters' program included an address by C. L. LaFountaine, general safety supervisor, Great Northern, St. Paul, Minn., on the Importance of Safety in Track Maintenance, and an open-forum discussion on the Problem of Employing and Retaining Men Capable of Becoming Section Foremen. G. M. O'Rourke, assistant engineer maintenance of way, Illinois Central, Chicago, acted as moderator of this discussion.

The principal address at the joint session on Tuesday afternoon, was presented by J. P. Kiley, president, Chicago, Milwaukee, St. Paul & Pacific, whose subject was Today's Challenge to Railway Maintenance Officers. He was followed on the program by a showing of the sound motion picture in color, Song of Mid-America, which was produced by the Illinois Central to commemorate its centennial year.

The final feature on the program of the Tuesday afternoon session was a round-table discussion of the problems of rehabilitation that were encountered during the July floods in Kansas and Missouri and the methods used to solve them. The moderator of this discussion was R. H. Beeder, assistant to chief engineer, Atchison, Topeka & Santa Fe, Chicago. Members of the panel included John Marsh, bridge engineer, Chicago, Rock Island & Pacific, Chicago; F. N. Beighley,

division engineer, St. Louis-San Francisco, Ft. Scott, Kan.; A. B. Chaney, assistant chief engineer-maintenance, Missouri Pacific, Lines, St. Louis; and N. W. Williams, roadmaster, Missouri Pacific, Council Grove, Kan. One of the more interesting phases of this discussion revolved around the fact that, as a result of submergence, many miles of yard and main tracks were covered with silt to a depth of from several inches to several feet, and that mechanical equipment, including track cleaners and force-feed loaders, was used extensively to clear the tracks of this material.

A portion of the closing session on Wednesday morning was devoted to a question-and-answer period. In preparation for this feature Mr. Halverson had previously requested that the members write out any questions that they might like to have answered and turn them in to the secretary. In addition to these written questions others were put forward verbally from the floor. Such problems as the safe operation of motor cars, the keeping of cost records on the maintenance of work equipment, the inspection of track where section gangs are transported by truck, and the amount of manual attendance required for switch heaters in use at power-operated switches, were discussed during this session.

See Rail Welding

Following the close of the convention on Wednesday noon approximately 180 of those in attendance participated in a bus trip to a point near Joliet, Ill., where they saw the welding of rails into continuous lengths by the Oxweld pressure process, and the laying of these rails in track of the Elgin, Joliet & Eastern.

In the election of officers, held at the closing session on Wednesday, Mr. Whisler was advanced to president; R. H. Gilkey, division engineer, Central of Georgia, Savannah, Ga., was advanced from second vice-president to first vice-president; F. G. Campbell, chief engineer, Elgin, Joliet & Eastern, was advanced from director to second vice-president; and E. E. Crowley, roadmaster, Delaware & Hudson, Albany, N. Y., was elected treasurer. Directors elected were E. L. Anderson, chief engineer, St. Louis-San Francisco, Springfield, Mo.; and E. F. Snyder, assistant to chief engineer, Illinois Central, Chicago.

C. A. Roberts, engineer of structures, H. J. Weccheider, engineer maintenance of way, R. J. Pierce, division engineer, I. H. Schram, chief engineer, J. S. Parsons, assistant chief engineer maintenance of way, all Erie

Abstracts appear below of the addresses by Messrs. Aydelott, LaFountaine and Kiley. Also presented in the following pages are complete versions of the six committee reports, together with brief abstracts of the discussions that followed their presentation. The open-forum discussion of the problem of employing and retaining men capable of becoming section foremen will be presented as a feature article in an early issue.

ECONOMIES NEEDED IN ALL DEPARTMENTS

In his address at the opening session Mr. Aydelott expressed himself as being somewhat apprehensive that the difficulties facing the railroads in the country's mobilization period "may somewhat restrict the activities of your particular field as time passes." Furthermore, he said, there is a financial problem because of the railroads' failure to "secure an increase in their charges commensurate with additional costs that have been thrust upon them through higher wage rates, increased costs of material and increased taxes." He implied, however, that traffic volume may partially offset these increased costs.

Because the money needed to assure adequate railroad earnings is not to be forthcoming in the required amounts through increased charges to the shipping public, "it will be necessary," said Mr. Aydelott, "for each department of the railroads to secure the utmost in economies in the operation and maintenance of the railroad plant." While material shortages may impose obstacles in obtaining the necessary maintenance tools and machines, "it is hoped," he continued, "that a program of mechanization, which has had such worth-while results thus far, may be continued, although it may take somewhat longer to get delivery of these machines than heretofore." Mr. Aydelott told his listeners they may depend on the manufacturers of roadway machinery "to work diligently to maintain their normal rate of production, and that we in the A.A.R. will assist them all possible should they find it necessary or desirable."

Mr. Aydelott also spoke of the necessity of making a thorough cleanup of scrap or obsolete material at the end of the maintenance season to secure scrap for the national defense program, and urged maintenance men to motorize their gangs as one way of adding to the productive time. Speaking of the greater efficiency of the railroads he said that the carriers were operated in 1950 with 440,000 fewer employees than were required in 1929, and said that if these additional employees had been on the payroll last year the added annual cost to the railroads would have been $1½ billion, or double the amount of their net railway operating income. He then traced in detail the factors behind the improved efficiency of the railroads, stressing the need for continued programs for improving the physical properties.

IMPORTANCE OF SAFETY

In his address on the Importance of Safety in Track Maintenance, Mr. LaFountaine first outlined briefly the results of a study he had made of progress in accident prevention on the American railroads since 1923. For the purposes

of this study he divided the 27-year period into four parts, namely, that of 1923-1929, which he called a period of peace-time stability; that of 1930-1940, called the depression period; that of 1941-1945, called the war period; and that of 1946-1949, called the present post-war period.

According to Mr. LaFountaine the casualty frequency rate to all employees on duty during the depression period decreased 66.9 per cent in comparison with the peace-time stability period. In the war period, he said, the casualty frequency rate decreased 51.7 per cent as compared with the peace-time stability period, while in the post-war period the casualty rate decreased 58.1 per cent as compared with the peace stability period. He went on to point out that the fatality rate of employees on duty during each of the four post-war years was the lowest in the history of the American railroads, with the year 1949 showing marked progress over the previous years. The maintenance-of-way department, he said, did its full share in bringing about this gratifying accomplishment in the field of accident prevention.

Comparing the casualty rates for employees in various departments, Mr. LaFountaine said that the maintenance of way and structures department has the second lowest casualty rate, but that the fatality rate in this department is more than twice as high as that of the maintenance-of-equipment department. While it is true, he said, that the frequency rate in the maintenance-of-way department has improved markedly over the years, it is still not good enough. Pointing out that during the last five years there has been an average of 164 maintenance-of-way employees killed and 5,505 injured annually, he noted that the majority of the fatalities in this department occurred as a result of train and train service accidents. There are two causes of such accidents, he said, namely (1) the operation of motor cars, and (2) employees struck or run over. In a discussion of motor car accidents he reviewed the development of two rules relating mainly to the use of train lineups, which were forwarded to the chief operating officers of the member roads of the Association of American Railroads early this year by Mr. Aydelott.

While Mr. LaFountaine doesn't believe that the recommended changes in the motor car lineups will solve the problem, he believes they are "a good place to start." In the many motor-car accidents which he has investigated it was seldom that he "found a case where there was not a rule violation, lack of care, or failure to use good common sense on the part of the foreman or the motor car operator, and which proved to be partly or wholely responsible for the accident." As a means of reducing motor-car accidents he discussed the use of track car indicators, portable telephones, and proper mechanical care of the cars.

Mr. LaFountaine noted that accidents involving employees struck by trains or cars have proven to be the most prevalent cause of fatalities. He said that employees assigned to do work under conditions where they cannot properly protect themselves against movement of trains, engines and cars, should be given protection by assigned employees who are free to do just that one job.

MANPOWER MUST KEEP PACE WITH MACHINES

Speaking of the great steps that have been taken in mechanizing track-maintenance work, Mr. Kiley, in his address at the joint session on Tuesday afternoon, inquired as to "how many of you could have foretold only a few years ago that **practically every step** in the laying of rail would some day be done with machinery? Or that stone ballast would be dug up, cleaned and replaced by machines at the rate of a mile or more an hour?" Predicting that there will be even more mechanization in the future Mr. Kiley then raised the question as to whether "our manpower is keeping up with all these mechanical improvements? Is our productivity rising in proper proportion to the railroads' huge investments in labor-saving devices?" In these days of sharp competition with other forms of transportation, he continued, the highest possible productivity is essential to enable the railroad industry to meet—and beat—that competition and maintain the leading position it has always held in the bulk transportation field.

In Mr. Kiley's opinion the work of the maintenance-of-way forces has never been as important as it is at present, and he thinks it will become even more important as time goes on. He went on to point out that railroad track has come to be "a scientifically designed structure, and more and more care is required to maintain it to the required high standard. Our track forces must be equal to this task. The need for capable men to train as foremen perhaps was never greater than it is at present." He urged the associations to make a continuing study of this problem.

Referring to pessimistic comments that men nowadays tend to shirk responsibility and lack the spirit of loyalty, Mr. Kiley commented to the effect that there have always been such men. He firmly believes that "we have young men coming up with just as much capacity for loyalty as the foremen you rely upon today."

Subjects for 1952

At a meeting of the Executive committee of the Roadmasters' Association, which was held after the close of the convention on September 19, a list of six subjects was adopted, on which committee reports are to be prepared for presentation at the 1952 convention. These subjects are as follows:

(1) Maintenance and Inspection of Turnouts

(2) Apparent Effects of 40-Hr. Week on Track Maintenance

(3) Safety and Operation of Motor Cars and Other Mechanical Equipment

(4) The Importance of the Conservation and Classification of Track Materials

(5) Value of Records Concerning the Maintenance and Repair of Work Equipment

(6) Extending the Life of Cross and Switch Ties

Economies Derived From Use of Weed Eradicators

Report of Committee*

At the 1948 meeting of the Roadmasters' and Maintenance of Way Association, the committee on "Modern Methods of Controlling Vegetation and Woody Plants" covered the various methods of weed eradication very carefully. That committee's report was probably reread and studied by many members of this committee, as we are sure you will all agree that each year sees the introduction of improved methods of eradicating weeds and noxious grasses, as well as brush, on the right of way. Even though the 1948 committee so ably described the different types of growth, the reasons and time for destroying them, and the various means of eradication, it is possible that some repetition will and should occur in this report.

It is the duty of this committee to discuss the necessity for weed control, the types of troublesome weeds and the most effective killing stage, the methods followed in eradicating them and the cost of weed removal by the most economical of these methods. However, it should be understood that such figures on the cost of weed control as are submitted are given in the knowledge that cost figures on one railroad may be of little value to another.

Proper control of vegetation includes not only the roadbed but the entire right of way from fence to fence, including yards, station grounds and areas around shops and enginehouses. The greatest primary benefit, however, is believed to result from the elimination of weeds in the roadbed, particularly in the ballast section.

Reasons for Weed Control

Why the necessity for weed control? The presence of vegetation in the roadbed prevents proper drainage, one of the essentials of good track. Continual growth catches and holds dust, dirt and other foreign matter and, with subsequent decay, fills the ballast with foul material, with the result that it becomes dirty and clogged until it sometimes becomes necessary to clean or remove the old ballast and substitute new. Therefore, keeping a roadbed free from weeds not only reduces maintenance costs but capital expenditures as well.

The eradication of weeds and grasses within the ballast section has considerable influence upon the amount of labor required to maintain track. The operations so affected include (a) the renewal of crossties, (b) the proper maintenance of ballast, and (c) the maintenance of adequate drainage. Where the track ballast is full of vegetation the amount of labor required to renew ties will be increased from 10 to 50 per cent over that required where ballast is weed free. When vegetation is allowed to grow in ballast, the service life of the ballast is shortened appreciably and there is a gradual increase in the cost of track maintenance, or the standard of maintenance is lowered. Eventually the value of the ballast is destroyed, partially by vegetation, and increased maintenance costs require the renewal of ballast. The saving in labor costs by a definite program of weed eradication can be determined by a study involving the cost of labor and ballast material, the character of the railway, and the cost of eliminating the vegetation. Vegetable growth in the ballast section impairs drainage, which in turn results in a loosening and churning action of the joint ties. As the density of the vegetation increases, it gradually blocks the drainage openings between the particles of ballast and causes rough track which requires additional maintenance labor plus more frequent cleaning or renewal of the ballast.

G. W. Neal
Chairman

Benefits derived by keeping the track free of vegetation are as follows:

(1) Facilitates maximum drainage of the ballast and roadbed
(2) Decreases fouling of ballast
(3) Increases life of ties
(4) Reduces labor for normal maintenance
(5) Reduces interference with traction
(6) Facilitates tie and track inspection
(7) Helps prolong the life of track materials
(8) Improves appearance
(9) Prevents snowdrifts

There might also be included in this list such things as employee safety and health, i.e., trainmen tripping and allergy reactions.

Types of Weed Growths

The determination of the stage in the growth of weeds at which methods of destruction are most economical and effective necessitates a knowledge of their habits and methods of reproduction. The life history of weeds can be related to methods of control. Classified according to life span, weed species fall into the following groups:

(1) *Annuals*—Annuals live but one year, produce a crop of seed and then die. Annuals reproduce by seed only and are classified into two groups, summer and winter annuals. Summer annuals germinate in the spring, the plants grow to maturity in the summer and die by winter. Winter annuals germinate in the fall or early winter and remain alive during the winter in a vegetative condition. In the spring they complete their growth, mature a crop of seed and then die in the late spring. All methods of controlling annuals revolve around the prevention of seeding. Annuals in the early growth stages are easily destroyed and once the top is killed the root has no power of regeneration.

(2) *Biennials*—Biennials have a life span of two years. The first years' growth includes germination in the spring and the development of a crown of leaves and a fleshy taproot which serves as a food-storage organ. These plants live through the winter, produce new stalks or stems the following spring and later flower and produce seed at the end of the second year. Biennials are controlled like annuals, the treatment best being made during the first year.

(3) *Perennials*—Perennials live for three or more years. In many cases no seed is produced the first year but seeding occurs each year thereafter for the life of the plant. Perennials propagate by seeds or underground root parts or both. Their roots live from year to year

*Chairman of this committee was G. W. Neal, superintendent, Chattahoochee Valley, West Point, Ga.; vice-chairmen were W. C. Oest, principal assistant engineer, Ft. Worth & Denver City, Ft. Worth, Tex., and L. J. Gilmore, general roadmaster, Great Northern, Spokane, Wash.

G. Switzer, assistant division engineer, W.P.; J. N. Woodell, general roadmaster, A.C.L.; H. W. Kellogg, division engineer, P.M. dist., C.&O.

J. M. Reardon, track supervisor, N.Y.N.H.&H.; B. Hager, roadmaster, C.&N.W.; I. D. Talmadge, engineer maintenance of way, L.&H.R.

but in most cases the portion of the plant above the ground dies each fall and new aerial growth starts the following spring. For the control of perennials two things must be accomplished: (1) The old plants must be prevented from ripening seed, and seedlings developing from seeds already present in the soil must be killed; and (2) the existing stand of established plants must be destroyed.

There are four predominant methods of weed control.

I—Mechanical: (1) Hoeing, (2) tillage, (3) mowing, (4) burning, (5) flooding, and (6) smothering.

II—Competitive or smother species.

III—Biological, involving use of parasites.

IV—Chemical: (1) Contact herbicides, (2) translocated herbicides, and (3) soil sterilants.

Of the mechanical methods of weed control, mowing and burning appear to be the most practical methods, although some roads report considerable use of diskers and scarifiers on secondary main lines. Smothering and flooding obviously are not feasible although a practicable means of smothering may not be beyond the realm of possibility. Handweeding on railroad rights of way cannot be justified with present-day labor costs. To be an effective means of weed control a given area must be hoed or pulled several times during the season.

Mowing has as its objective the prevention of seed production and reduction of tall weed growth. Roads using mowing machines report operation of both on-track and off-track equipment. They feel that off-track mowers are particularly advantageous due to the fact that only one operator is required and the tractor can be used for other work in the off season. Little information is available on the cost of mowing but some railroads figure a cost of $4.50 to $9.00 per mile for mowing the roadbed shoulders with on-track mowers. These figures give the cost per mowing (both sides), and, of those reporting, the average number of mowings is three per year. One road reports a saving of $1,500 per year per machine over hand work by using off-track mowers. Generally the number of mowings necessary vary with climatic and geographic conditions. Under most conditions mowing is a poor means of weed control.

Weed burners, although being used quite extensively on some railroads, generally may be considered as a means of destroying objectionable debris rather than as a weed-control measure. Ordinarily, the burning procedure calls for one treatment to kill the vegetation, followed a few days later by a second trip to burn the dead vegetation. Best results from burning can generally be had if this procedure is followed after the weeds come into full bloom in the spring. Subsequent burns are then given as soon as new buds start to form on plants. This usually means several applications per year.

This method of eradication is objectionable to many roads. Besides being a fire hazard on a narrow width of kill, it scorches treated ties, possibly reducing the life of the timber. This method also warms up seeds in the ballast, which starts another growth of weeds. The economics of weed burning depend upon how fast and how often an area is treated. Some railroads report a cost as low $8.51 per mile, which includes fuel, burner operation, train pilot and follow-up crew with extinguisher car, while costs given by others range up to $20 per mile for material plus several section gangs to follow putting out fires.

Competitive or smother crops have no value for ballast treatment but when railroads practice weed control to the right of way fences this may be of value. As an example, the growth of Bermuda grass may be encouraged, with the result that other more objectionable species will be eliminated.

Biological means of weed control involves the use of insects or fungus organisms that live on weeds. This method is obviously too dangerous to be considered.

Chemical Methods

Chemical research in the last two decades has resulted in the development of new methods and chemicals for use in weed control. There are few weed problems in which chemicals cannot aid. Good chemical weed control is, of necessity, dependent upon the type of weed infestation, environmental factors and finally upon relative costs and benefits of the treatment.

Spray equipment to control vegetation has been in use on railroads for many years but in the past has been generally confined to the ballast section of the roadbed. The types now in general use are divided into several different classes as follows:

(1) Spray trains with fixed nozzles on a spray car followed by a number of cars containing concentrated chemical solutions and water.

(2) Small on-track spray machines with a tank capacity up to 2500 gal., self-propelled or towed by a motor car.

(3) Small wheelbarrow and "pack back" types, with capacities ranging from 5 to 50 gal.

(4) On-track spray cars equipped with retractable extension spray arms.

(5) Crawler tractors and one or two crawler trailers with pumps operated from a power take-off.

(6) Automotive - type spray equipment consisting of truck and trailer with pump and tanks.

Some spray trains or spray units are operated by contract sprayers and others are railroad owned. They are usually equipped with speedometers to control the speed of the work, and the discharge in gallons per minute at various pressures is calibrated to give the desired dosage per square foot. The cost per mile for the operation of spray trains varies appreciably depending upon the chemical used, type and density of vegetation and

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time "lost" while the spray train is idle. Some railroads spend as little as $19 per mile for a single spraying each year, while other roads spend as much as $85 to $90 for one to three sprayings. Examples of this type of application are as follows:

A midwestern railroad in 1950 sprayed a chemical over a width of 24 ft. on main lines and 18 to 20 ft. on sidings and branch lines. A total of 2274.4 miles of track was sprayed in this manner. They used an average of 52 gal. per mile. The cost of chemical and freight from the shipping point was $25.14 per mile. The labor and work train cost for this spraying increased the cost of 1950 spraying about $3 per mile. This railroad sprayed again in 1951, increasing the spraying width by 4 ft. on each side. The increased cost of chemical account higher raw material prices, and with the additional width which will necessitate an average of 72 gal. per mile, the cost will be about $45.50 per mile for chemical, labor and work train. Approximately 70 to 90 miles per day can be sprayed with the large modern spraying equipment and tanks of ready-mixed chemicals.

During the past several years a southern road applied a spray chemical to its tracks and roadbed. In 1950 this road concentrated on a strip of the roadbed from 8 ft. from center line of track to 14 ft. from center of track, or a width of 6 ft. The chemical was used at an average rate of 62 gal. per track-mile, covering a strip 6 ft. wide. The cost of material was $29.24, while that of the work train and the labor of applying was $4.22, or a total cost of $33.46 per track-mile.

For the past several years some roads reporting have gone in quite extensively for spraying with a solution of creosote and distillate, spraying the tie section and ballast shoulder. They use a mixture of 25 per cent creosote and 75 per cent diesel fuel, applying an average of 75 gal. per mile of main track. On branch lines and side tracks, where the weed growth is heavier, 150 gal. per mile have been used. Two to three sprayings are made on the lines where rainfall is heavy. Where three sprayings are required, the cost is about $36 per mile of main track, and proportionally more on branch lines. Best results are obtained if the spraying is done while the vegetation is young and dry. Some benefit is derived from oil spraying due to protecting the ties and coating the sides of rails and fastenings. The latter appears particularly helpful on track in coastal country subject to corrosion due to salt in the air.

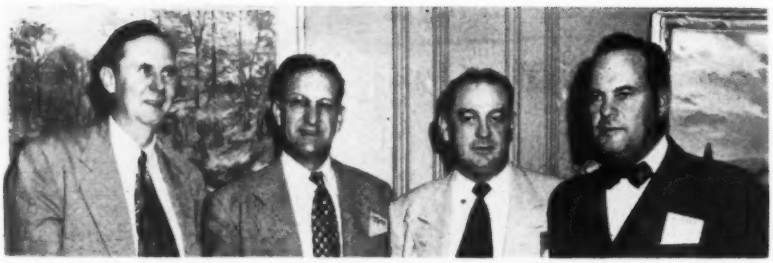
Contact Weed Killers

A contact weed killer is one that is applied to top growth and kills only the tissues with which it comes in contact. It may be selective or non-selective. A selective contact killer kills certain species in a mixture of plants, leaving the others relatively undamaged. Some compounds may be non-selective at a certain concentration and selective at a lower concentration. Non-selective contact killers are what is commonly referred to as chemical weed mowers. A non-selective contact killer is one which destroys all the top growth regardless of species. Common examples of this class are petroleum oils, coal tar, sodium chlorate, sodium trichloroacetate, strong acids, chlorophenols, etc. It must be remembered that almost any soluble chemical in high concentration will kill plant tissue. Consequently, any material may be used for contact killing, the limiting factors being cost and convenience.

Due to their inherent dangers to livestock, pets and human beings, arsenical based weed killers, which are capable of doing a good job, must be handled very carefully. For many years sodium chlorate sprays were used for ballast weed problems. In certain areas of the country fires resulted where this oxidizing chemical was used. Sodium chlorate is, however, a very good weed killer and there are on the market today a number of weed killers well suited for ballast area work which contain as basic ingredients sodium chlorate and sodium borates. These combine the effectiveness of both borates and chlorates and many of these compounds or combinations are non-fire hazardous; some are non-corrosive as well. Sodium trichloroacetate is an effective grass killer.

Translocated Herbicides

A translocating herbicide is one that moves downward through the conducting tubes of the plant after it has been applied to the foliage. There are two ways that this can happen. A chemical, for example 2,4-D, can be taken up by a plant and translocated by plant processes, or translocation can take place mechanically as in the case of applying oil. In this case translocation probably takes place by capillary action. There are a considerable number of chemicals which will translocate but not all of them are harmful to the plant. Most common of the translocating weed killers are acid arsenicals, sodium chlorate and a host of chemicals known as growth regulators. Growth regulators are chemicals, either natural or synthetic, that are hormonal in their action, that is, they spread throughout the entire plant and are effective in minute amounts. Concentrations of .05 to 1 per cent are commonly recommended. Hormone-type weed killers bring about the death of a plant by deranging its growth and metabolism. The two most common plant-growth-regulator weed killers are 2,4-D and 2,4,5-T. These acids can be applied as is, as a sodium, ammonium or amine salt, or as an ester which is the reaction product of the acid with an alcohol. Generally the ester formations are much more lethal than either the free acid or salts of the 2,4-D or 2,4,5-T. This is explained in part by the fact that the oil acts as a solvent on the waxy exterior of plants and allows better penetration.



H. E. Michael, associate editor, R.E.&M.; F. N. Beighley, division engineer, F. E. Short, assistant chief engineer, H. A. Matthews, general foreman, all St.L.-S.F.

It seems hardly necessary to remind ourselves of the importance of unwanted growth on the open rights of way. This area has received less concentrated attention than on the roadbed and represents considerably more acreage. The need for vegetation control is quite different, as in most instances grasses are desirable to prevent erosion, but brush, trees and tall growing weeds must be controlled as their growth (a) reduces the range of vision in cuts and at highway crossings; (b) obscures the locations of roadway signs and drainage culverts; (c) interferes with inspections of bridges and culverts; (d) retards the flow of water through cut ditches and culverts; (e) when dry and matted, constitutes a fire hazard to adjacent land, wooden structures, poles and fence posts; (f) grounds transmission lines; and (g) causes the right of way to present an overall unsightly appearance.

The fight against brush is an expensive and burdensome task, but it is a fact that chemical brush spraying is economical. The chemicals 2,4-D and 2,4,5-T are used by many roads to eradicate vegetation on this area of the railroad. As you know, 2,4-D made its reputation first as a selective killer of many broad-leaved weeds. Since it doesn't kill all broad-leaved plants, a close relative, 2,4,5-T, came into the picture and many maintenance men have found it superior to 2,4-D and some report a mixture of the two a very satisfactory and economical formulation for woody growth control.

Caution should be exercised in the use of 2,4-D-type compounds as some formulations are extremely volatile. Ammonium sulfamate is very effective on some woody growths. This chemical is very corrosive but is non-poisonous and non-volatile. It also acts as a fire-retardent. As for the cost of right of way spraying, an eastern road reports a cost of $205.76 per mile for chemical and $8.58 for work train. The contractor furnished the labor and equipment which is included in the cost of the chemical. They were able to spray to the edge of the right of way in most cases, and the above figures represent spraying both sides of double track from the toe of the ballast to the fences on a 100-ft. right of way. Although accurate figures on the cost of cutting brush were not available, the road feels that this method is considerably higher than the cost of chemicals. Others believe annual maintenance cost of chemically-controlled right of way is from one-half to one-third that of comparable mechanical clearance.

Soil sterilization is a condition whereby soil is so altered by the addition of chemicals that it no longer sustains plant life. If this period of sterility lasts one year or less it is called temporary soil sterilization; if it lasts more than one year it is called permanent soil sterilization. These terms are relative and because of various factors they cannot be strictly applied with respect to time. Chemicals commonly called soil sterilants are arsenicals, boron compounds, petroleum residues, salt and sodium chlorate.

With chemical herbicides that act through the soil, it is necessary that the chemical be present throughout the layer of the soil in which roots are growing. It has to remain there long enough to kill all of the roots before it is decomposed or leached out. Consequently the effectiveness of a soil sterilant is dependent upon the species of plant growth, the type of soil, and climatic conditions. Generally the dosages required for soil sterilization are quite high and are economically sound only for small areas. A large number of the railroads reporting have used sodium borate ore or a concentrated form of this chemical for weed problems about timber trestles, telephone and telegraph installations and timber piles, etc. This compound is said to be non-combustible, non-corrosive and non-poisonous. It not only seemed to control vegetation completely, but had a cumulative effect, that is, after one years' application the vegetation was much sparser, and it was the user's opinion that after a period of about three years it would be possible to very materially reduce the quantity of application and still obtain complete eradication. Some roads have kept accurate figures as to cost and find that an average saving of $1.29 per lin. ft. of trestle per year is realized over the hand scalping method. Others believe that hand costs have been reduced 75 per cent due to this chemical treatment.

New chemicals are being developed, also new compounds or formulations of present products. Research and experimentation have increased the knowledge of the reagents previously used. It seems evident that the economy achieved, especially from a chemical program, is in proportion to the effectiveness of the chemical used. No one material on the market today will solve all weed and brush problems. A more effective chemical, even if sometimes at a relatively higher cost per mile, may afford outstanding long-range economies. When considering a chemical weed or brush killer consult a number of manufacturers or suppliers. Establish tests at various points along your line which are indicative of general conditions in that area. Repeat on a larger scale the following year if the previous year's work was promising. If you know that other lines in your general area are receiving good results from chemicals that did not look too promising to you and if it appears that such materials would save your road money if they had worked, give them another trial and look into how your applications were made. Take advantage of the technical field services offered by the manufacturers. Most suppliers will be pleased to arrange for actual demonstrations on your road.

For the most part the railroads find it necessary to use the formulations commercially available. These formulations, while successful for many conditions, are designed principally for agricultural purposes. It is to meet railroad requirements particularly that further study and research appears necessary.

Conclusions

The committee offers the following conclusions:

(1) That control of weeds, grass and brush on the railroad property is given considerable attention by those responsible for railroad maintenance.

(2) That proper control includes not only the roadbed but the entire right of way from fence to fence, including station grounds, shops and yards.

(3) That high - grade railroad maintenance requires proper weed eradication, thus proving that proper control is economical.

(4) That, although it is not the duty of this committee to make a definite recommendation as to the relative merits of various methods of vegetation control on our railroads, it believes the greatest economy can generally be realized from the use of chemicals. Many thousands of dollars are expended annually for weed control on the railways and a program of eradication can no longer be a rule of thumb, hit-or-miss practice. Under present conditions the use of chemicals for such control appears to have great possibilities for effectiveness and economy provided that the railroads, through research, endeavor to have chemicals designed especially for their requirements.

DISCUSSION

Opening the discussion, W. J. Savage (T.&P.) mentioned that in Texas the use of hormone weed killers is prohibited by state law. G. M. O'Rourke (I.C.) discussed some of the difficulties encountered by his road in Iowa where the state weed commissioners are unusually demanding. Mr. O'Rourke also mentioned that killing weeds along the I. C. tracks in Chicago suburban territory presented difficult problems because there the tracks are flanked by lawns and parks which must be protected against damage by the weed-killing chemicals used. Referring to the statute that prohibits the use of hormone weed killers in Texas, T. P. Mahaffey (M.P.) said that 2, 4-D could be used in that state if a special permit was obtained and the cotton fields adjoining the right of way were protected.

T. M. Von Sprecken (Sou.) wanted to know whether there was any hazard in connection with spraying weeds with 2,4-D or 2,4,5-T in the vicinity of high-tension wires. In reply, C. F. Reade (Reade Mfg. Co.) stated that he has witnessed the use of these chemicals on electrified railroads where the spray came in contact with the third rail without creating a hazard.

E. C. Lawson (Read.) inquired whether any figures have been developed comparing the cost of spraying weeds by contractors with spraying by company-owned equipment. The chairman replied that the committee had developed no figures and had reached no conclusions on this point. Some roads, he said, contract the work to save their men for other work. Other roads must use their own men because of labor contracts in force.

Benefits to be Derived from Properly Educating or Instructing Maintenance Personnel

Report of Committee*

• Education, or the endeavor to educate, starts from the time we are born and should continue thereafter, for it not only increases our usefulness to others, but helps to create a greater interest in living. After formal education is completed and we are on our own, some feel that there is no longer a need for further learning, while others continue to improve and develop by instruction in their vocation.

Fortunately, practically all maintenance-of-way personnel, from laborer to top supervision, are willing to accept education or instruction that will help them to better understand their jobs and make these jobs easier to perform safely and efficiently. In any maintenance organization, the efficiency of the work done by the personnel in that organization depends largely upon their personal initiative, aptitude and upon the education and instruction given them.

The members of this committee who contributed information for this report all expressed the feeling that, although the subject is basically of great importance and fundamental to the safe, efficient, and economical operation of maintenance organizations, it has not received the concerted effort of supervisory officers on many railroads, resulting in organizations that have become static or have retrogressed.

R. V. Dangremond
Chairman

The matter of education and instruction must not be limited to a few persons or a certain category in the department, but rather must be thought out and programmed to include every class of worker in the organization.

At the outset, your committee believes that proper education and instruction comprises the most fertile field for reducing maintenance-of-way costs. It is realized that the railroads by which we are employed have been faced with substantial increases in the cost of operation. This is due not only to increased costs of materials and equipment, but is also the result of higher wages now being paid, changes in working agreements, and taxes that add to wage costs. All this emphasizes the necessity for bringing about a substantial cost reduction by the proper education and instruction of maintenance personnel.

It is recognized that the education and instruction of maintenance personnel presents many difficulties due to the nature of the work and to the fact that the gangs performing work are scattered over considerable territory.

It is impossible for a supervisory officer to be present at all times where work is performed to see that each job has his personal supervision and to see it through to a safe and economical conclusion. It becomes apparent, then, that, in addition to personal-on-the-job instruction, it is necessary to resort to other more general methods, such as apprentice training, moving pictures, group meetings, books of standards, trade magazines, tours, correspondence courses, instruction cars, maintenance clubs, and associations such

*Chairman of this committee was R. V. Dangremond, special roadmaster, Elgin, Joliet & Eastern, Gary, Ind.; vice-chairmen were E. L. Collette, division engineer, St. Louis-San Francisco, Ft. Smith, Ark., and G. W. Wilson, vice-president, International Correspondence Schools, Scranton, Pa.

E. M. Unzicker, division engineer, G.M.&O.; J. L. McMillan, track supervisor, G.M.&O.

W. H. Ripken, district manager, Fairmont Railway Motors; C. W. Mitchell, supervisor maintenance equipment, N.Y.C.

as this where supervisors receive information on the latest and most efficient methods of performing work.

Planned Education Necessary

Proper education and instruction does not mean occasional on-the-job instruction but real, intensive, planned education and instruction by several of the methods stated above. Proper instruction will eliminate delays and save time lost in making unnecessary moves, and coordinate the various stages of work so that each follows in its proper sequence. It also avoids the interruption of work during its progress to take up some other job that needs immediate attention, reduces overtime and travel time, and avoids the use of unnecessary equipment. Proper instruction also produces more lasting results with a resultant lower unit cost.

Benefits from properly educating or instructing maintenance personnel in general is of greatest importance, but of particular importance are benefits derived from properly instructing new employees. First impressions are lasting; the opinion and instructions a new employee gets of the railroad during his first days on the job will in many ways determine his attitude and effectiveness in the future. In the past much of the instruction given to the new employees was by the sink-or-swim method, learning by trial and error. For both the employee and the railroad this was a time-wasting, costly, procedure.

On-the-Job Instruction

Much of the effective instruction necessary to new employees in the maintenance - of - way department must be on-the-job training by supervisory personnel because of the very nature of the work, and because practical experience under a trained supervisor is the only method of instruction available for certain maintenance-of-way work not covered by printed material or other means of instruction. The minutes spent in good, on-the-job instruction of a new employee will save hours in the months ahead by eliminating a variety of problems that would not exist if proper instruction had been given, and by eliminating the necessity of correcting costly mistakes caused by lack of training, and mounting high costs.

Properly-trained personnel will do a job well and with a minimum of immediate supervision, thus increasing time for supervision to develop new ideas and methods.

Due to the pressure of work and lack of time for supervisors to devote sufficient time for on-the-job instruction, it may be necessary to delegate the work to someone else qualified in the department or a representative of the personnel department, who can devote much of his time to that responsibility; however, an employee usually learns best in on-the-job training if instructed by his immediate supervisor. This type of instruction and education is also of benefit because it helps tap all the resources of every employee quickly enough to separate those who will make good material for promotion and for further training by other methods mentioned. With the new employee proper instruction can go far to help stimulate his interest in maintenance-of-way work as a career.

Results in Safe Workers

One of the foremost benefits to be derived from educating maintenance personnel is a safe worker. The benefits of instruction and education in safety is a comprehensive subject in itself, but some of the broader aspects of it must be included in the general subject assigned to this committee.

It is impossible to evaluate the monetary benefit of safety instruction or safety education among maintenance-of-way personnel, but certainly some of the benefits are shown by a comparison of the personal injuries, lost-time injuries, and fatalities from year to year. Nothing is of greater benefit to a safety program than proper instruction and education. Some of the benefits of a good safety program through instruction and education are reduction of time lost from work due to injuries, thereby reducing the necessity of securing other men, instructing, and training them to fill the jobs of the injured men; and a reduction in claim settlements and payments or compensation.

Better safety through instruction and education obviously creates goodwill and better morale in maintenance-of-way organizations, and prevents suffering of the employee or his family through loss of wages, grief and sorrow.

The prevention of the loss of a man in a position of responsibility, who has already cost management a great deal to hire and train, is a real monetary benefit derived from proper instruction and education in safety. Men properly instructed in the best methods and means of maintenance are the men who will keep personal injuries to a minimum.

The safe worker is a benefit because he is an asset to the employing company as well as to his family. Assets and benefits in this sense are synonymous. Besides holding injuries to a minimum, the safe worker is one who utilizes each tool and machine to the utmost because the safe use is the best and most productive use of such tools and machines; and, therefore, benefits the employer in increased productivity.

Longer Life for Machines

Proper instruction in the use of tools and machines provides longer life of these units with a further reduction in unit cost due to the extended life of properly handled tools and machines.

The tendency to overstock both material and tools is very prevalent among maintenance-of-way forces. This costly bad habit can be eliminated through proper educa-

J. L. Hervieux, roadmaster, C.N.R.; C. Halverson, general roadmaster, G.N.; P. E. Belley, roadmaster, C.N.R.

E. L. Anderson, chief engineer, St.L.-S.F.; O. E. Fort, roadmaster, St.L.-St.F.; J. I. Smith, track supervisor, G.M.&O.

tion and instruction concerning actual requirements, costs of materials, and methods of obtaining the most from materials on hand and in service.

In recent years, a considerable number of new tools and machines have been developed to carry out maintenance - of - way work, and manufacturers of maintenance equipment are continually working on new and better tools and machines to perform various operations.

Proper education results in assigning the proper machines for the job at hand, and helps keep machines in first-class condition to avoid delays due to breakdowns that retard the progress of the work. It is important that proper education be given maintenance personnel concerning the machines and tools assigned to them. Equipment and tools can be seriously damaged by lack of proper lubrication, proper fuel, and by improper and careless usage. Most employees will watch these items more closely if they are aware of the investment involved in tools and equipment and will have a conception of the loss that is incurred when the equipment is made idle because of damage or breakage due to inefficient or abusive handling.

Timekeepers, clerks, foremen, and all maintenance supervision must be properly instructed concerning the making of their various reports to reduce costly errrors in accounting, avoid delays and wasted hours in hearings or investigations and loss of costly suits through improper or insufficient information in a report.

Better Personal Relations

Personal relations are bettered through proper instruction of maintenance personnel. Through better personal relations, productivity is increased involuntarily in most men. The increased productivity is reflected again in lower unit costs. Better relations also gives the supervisory forces more opportunity to further instruction and training with better reception.

A reduction of labor claims results from proper instruction and education concerning union agreements, avoiding rule violations caused by lack of knowledge of working agreement.

The methods and means for properly instructing maintenance personnel seem to be as varied as ideas will permit. Each active member of your committee had definite ideas as to how it should be done, but all agreed as to the benefits to be derived as set forth above.

Benefits Summarized

The conclusions developed by this committee concerning the benefits to be derived from proper education and instruction are:

(1) Increased safety resulting in inestimable savings, gain of goodwill and prevention of human suffering.

(2) Greater production or more economical maintenance. This may be expected because proper instruction acquaints the individual with the best methods and techniques as compared with local practice.

(3) Development of resourcefulness, self-reliance and respect for other points of view.

(4) Improved attitude and morale (better personal relations). The more an individual learns about his department, the other departments, and the railroad as a whole, the more loyal and cooperative he becomes. Improving his attitude will have a favorable influence on his men and on his associates.

(5) Provides material for further promotion. As the individual learns more about his work, the more responsibility he will be able to shoulder when needed to fill higher positions.

(6) Improvement in judgment, job planning and work progress.

(7) Better understanding of the total problems of railroading, and, therefore, a more correlated work attitude with other departments of the railroad which are interrelated to various degrees with the work to be accomplished.

DISCUSSION

C. J. Geyer (C.&O.) opened the discussion by pointing out that mounting costs have placed track-maintenance work in the "pure-gold" category, thereby making it imperative that workmen cut all the corners they can. Teaching them how to do that is one of the most vital elements in the prosecution of maintenance work. Mr. Geyer then told the story of the practical man who said, "if I had some education to go along with this sense of mine, I'd be a whiz". However, according to Mr. Geyer, it is conceivable that had that man gone to college he probably wouldn't have gotten the experience that gave him the sense he did have. Mr. Geyer used this anecdote to accent his belief that in railway maintenance work it would be ideal if 50 per cent of the supervisory employees were college trained and the other 50 per cent were so-called "self-made" men. He then cautioned that, on any on-the-job training program, employees should be taught how to think and where to get information rather than to train them how to do specific jobs.

In reply to a question asked by T. P. Mahaffey (M.P.) as to whether it is better to teach employees in groups or as individuals, L. W. Howard (I.C.) replied that their experiences in apprentice training had shown that it was better to evaluate individuals and train them out of their weaknesses. He went on to say that the success of any apprentice depends first on getting a good man with a fair education and a good moral background, and then apprenticing him out to a foreman who is capable of teaching him what he had learned from experience. He concluded the discussion by saying that he had gotten better results by transferring his apprentices from foreman to foreman, thereby giving them a more varied training.

Economies to be Realized in Handling of Ties

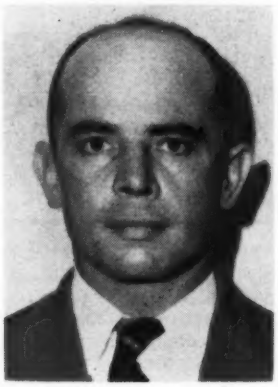
Report of Committee*

• The handling of ties in an economical manner is a subject that has doubtless been studied since the railroads came into existence. However, the substantial increases in labor costs that have occurred in recent years have caused this subject to be studied more intensively than ever. Apparently there have been no astonishing developments applicable to all localities and conditions since the practice of treating ties was started, but marked steps toward economy have been made, some of which are applicable under varying conditions.

Generally speaking, our greatest problems of economy after securing ties have to do with getting them to the point of application and placing them in the track. Distributing ties at the point of application directly from cars as received from creosoting plants will eliminate labor. One division engineer has cut his cost of unloading and distributing crossties almost 50 per cent by having his ties shipped from the creosoting plant in bundles loaded in gondola cars. When practical, the ties are unloaded on line of road with work train and crane. Only a crane operator and two laborers are necessary to carry this operation along with maximum efficiency. A car of ties can be unloaded in 10 to 45 min. by this method, the deciding factor being the density of tie replacement.

Should it be impractical to distribute ties with a work train along the line of road, there is still a saving to be realized by using a crane to unload bundled ties. This could take place at centralized unloading locations where future loading would possibly take place after accumulation of sufficient carloads of ties to justify a work-train day. Where low-side drop-end gondola cars are available for the unloading of bundled ties appreciable savings can be realized in unloading ties with work trains, using a crawler crane and moving from car to car—eliminating the expense of switching out cars after they are emptied.

With truck cranes being more widely used by many railroads there are labor savings to be realized by unloading bundled ties at outlying locations with this type machine. Since truck cranes usually travel over highways at speeds of 20 to 30 m.p.h., several cars of ties can be unloaded per day at outlying locations by a crane operator and two laborers when these locations are not too far apart. Bundled ties are usually held by either wire or other metal bonding, with a band around each end of the bundle about two feet from the tie ends. Ample precautions to prevent breaking of the bands while either loading or unloading the bundles are very important. This is easily accomplished by use of a singletree device hooked to the end of the crane cable, allowing an equivalent vertical strain on each band around the bundles. The bar of the singletree should be approximately as long as the distance between the bands. The hooks for engaging the bands should be suspended two or three feet from each end of the bar and should be of ample width, with rounded edges, to prevent cutting of the bands while the bundle is being handled.



R. H. Campbell
Chairman

Salvaging Old Ties

Many railroads have turned to the economical practice of salvaging ties released from main tracks and reusing them in yard and other secondary tracks. The movement of these secondhand ties to the points of reuse can be done very economically. Such ties have been loaded and unloaded for as little as 35 cents per tie. It is true that a new crosstie can be applied at the same cost as a secondhand tie and that the used tie will not last as long. However, it is possible to make three applications of a secondhand tie before reaching the overall cost of applying a new tie. This economy is based largely on the assumption that secondhand ties are applied mostly in locations where cull ties would be used.

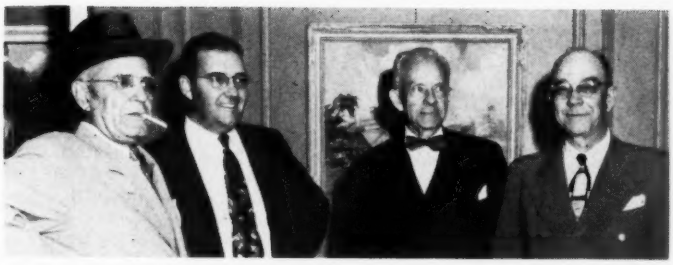
In the reuse of secondhand crossties, the method of moving them to the location of reuse is an important factor in determining the economy of the practice since it will cost the same to apply the relay tie as a new tie. The ties to be salvaged can be separated with negligible cost since they would either be disposed of by stacking for burning or by other hand methods. Loading of these ties should be either in bundles, in order to allow unloading in bundles, or on wood racks to permit rapid distribution by hand with minimum physical effort. Loading in bundles can be done by using wire, steel banding or cables for tying the ties together. Either banding or wiring the bundles can be done at a labor cost of less than 4 cents per tie, while the material cost will run very close to 2½ cents per tie.

While it is possible to salvage wire and banding for reuse, less time would be involved in handling slings of wire rope or cable. These slings will stand a great amount of reuse if not badly abused. Only one sling per stack containing 20 to 30 ties is necessary. Slings are made of ½-in. to ¾-in. wire rope or cable in 25-ft. lengths, with 4 rope clips being required per sling. The slings are made by doubling back the ends approximately 18 in. and applying the clips to form a loop on both ends of the sling. Application of the sling is made around the center of the stack of ties, running one loop through the other. Slings can be left around the bundles for use in unloading.

Tries Truck with Winch

A method of distributing ties that involves the use of a truck equipped with a winch has been explored by a supervisor. There are three reasons why this method has limited possibilities but there are economies to be realized when the operation can be made within these restrictions. One restriction is that without a special permit most state laws will not allow the movement of objects over their highways exceeding 4 ft. from center of vehicle. This restriction would confine the truck method of tie distribution largely to secondary roads. Another limitation is that the distribution of ties by this method would be confined to locations along the right of way that will allow truck passage adjacent to the track to be timbered. The

*Chairman of this committee was R. H. Campbell, assistant division engineer, Southern, Birmingham, Ala.; vice-chairmen were J. G. West, district engineer, Gulf Colorado & Santa Fe, Galveston, Tex., and E. L. Banion, assistant superintendent, Atchison, Topeka & Santa Fe, Topeka, Kan.



R. J. McComb, vice-president, Woodings-Verona Tool Works; W. H. Woodings, president, Woodings-Verona Tool Works; E. Condit, president, Rail Joint Co.; G. J. Geyer, vice-president, C.&O.

T. P. Mahaffey, roadmaster, M.P.; T. F. Scholes, president, T. F. Scholes, Inc.; J. F. Beaver, chief engineer maintenance of way and structures (Eastern Lines), Sou.

third and most important restriction is the abuse of the truck. Practically all operations can be proved false economy over a period of time if they involve the abuse of equipment. The truck should neither be overloaded nor operated over terrain requiring excessive strain to any part of the vehicle.

Load 40 Ties in 9 Min.

It is necessary to unload ties at locations accessible to trucks and in stacks within the capacity of the winch to be used. One truck driver and two laborers can load 40 ties on a truck in an average time of less than 9 min. by drawing up two bundles of 20 ties each. This time includes the placement and removal of the skids required to enable the ties to slide upon the truck bed with the side gates removed. In this operation it is necessary to have two skids approximately one inch thick placed the length of the truck bed and some 4 to 6 ft. apart to allow free passage of the winch cable between the truck bed and the ties. The second bundle of 20 ties can be winched snugly against the first bundle, thus permitting the entire load to be held in place for safe transit by winch break and standards at the rear of the truck bed. As the truck is driven along adjacent to the track to be timbered the ties are distributed from the truck by the same two laborers that loaded them. An advantage of this method of handling ties is that delays to the work occasioned by passing trains are held to a minimum. Such delays occur only when the men pause to observe passing trains for possible defective equipment.

Use of Special Cars

A method of distributing ties that involves the use of special cars is being used successfully on the New York Central. The equipment used consists of rebuilt containers which have side stakes that are hinged at the top to a horizontal member so that they swing outward. When ties are being loaded and transported the lower ends of the side stakes are locked to the sides of the car. To unload the ties the lower ends of the stakes are released, permitting the ties to be pushed off the side of the car, instead of being lifted over the side as is necessary when gondola cars are used for this purpose. In a recent experiment involving the distribution of about 500 ties per mile of track, ties were unloaded by this method at a cost of less than 2 cents per tie for labor alone, while the labor cost of distributing them from gondolas approximated 9 cents per tie.

DISCUSSION

The discussion of this report began with many members relating the advantages and savings that are to be obtained by strapping ties into bundles. Most of the men who have used this method stated that they were anxiously awaiting the time when restrictions on steel will be sufficiently relaxed to permit again the distribution of ties in bundles. J. E. Griffith (Sou.) cited the big savings that can be made when bundled ties are loaded in drop-end gondolas and unloaded by crawler cranes running from car to car. A. H. Whisler (P.R.R.) cautioned the members against "walking" crawler cranes through revenue cars that do not have auxiliary side bearings. He said that in carrying out this operation on sharp, heavily elevated curves, there is danger of the car tilting the crane excessively.

In reply to a question from President Halverson as to individual practices in salvaging ties, R. L. Fox (Sou.) stated that they can get 12 years of additional life from plate-cut ties removed from curves and placed in body tracks. C. E. Neal (S.P.) said that although most of the ties they remove have been in track as much as 25 years, many are still suitable for use in secondary tracks, primarily because they are creosoted.

Chairman Campbell (Sou.) told of an economical system of salvaging ties from a main track being retired in connection with the installation of a centralized traffic control system that eliminated the need for double track. Essentially the system consists of equipping an International crawler tractor with a Drott skid attachment which can scoop up about 25 ties from the ballast section, roll them into a bundle, and hold them while men tie wire around each end of the bundle. By this method 25 ties can be tied into easily handled bundles in a little over 2-min.

J. E. Griffith (Sou.) concluded the discussion of this report by telling of a system they used for distributing ties in the construction of the John Sevier yard at Knoxville, Tenn. He stated that the system could also be employed for the distribution of ties along the right of way wherever auto trucks could operate. For this operation one-ton and 1½-ton flat-bed trucks were used, on each of which a steel frame had been constructed so that it was free to slide from the front of the bed to the rear. The frame was controlled by a power winch mounted immediately behind the cab and just forward of the truck bed. By attaching a cable to the frame and running it around the pulley at the rear of the truck, the frame could be moved backward or forward over the bed of the truck. Ties were loaded with the frame in position immediately behind the cab and were laid crossways to the truck bed. To unload the ties, the winch was set in motion causing the steel frame to move toward the rear of the bed and to push the ties off the rear of the truck and onto the roadbed. This method distributes the ties uniformly and eliminates much of the hand labor necessary to place them in proper position.

Proper Care of New Rail to Increase Its Service Life

Report of Committee*

• Proper care of new rail to increase its service life is a very important and timely subject, broad in scope and covering a multitude of factors, all of which are important and must be recognized in order that steps can be taken to insure that new rail will carry most economically its greatest tonnage. All good maintenance practices have a direct bearing upon the expected tonnage life of rail, as do the speeds of trains, wheel loads, and the condition of rolling stock. It is a known fact that the life of rail depends primarily upon the care given it during installation and the quality of the maintenance it received during the early years.

C. E. Neal
Chairman

Begins at the Mill

Proper care of rail begins as it is rolled at the mills and then loaded on cars for movement to designated locations. Rail manufacturers have given much study and thought to the best means and methods of placing the rails on the cars in such a manner as to prevent damage in transit and to make the job of unloading and distribution simpler. As a result of these methods being used today, very seldom is a rail found that has been damaged in transit.

The generally accepted practice on various railroads today is to use a work train, with one or more cranes, to unload and distribute rail along the track as nearly as practicable to where it is to be laid. Rails that are being unloaded should be properly center marked and in balance and set on the subgrade in such a manner as to preclude any possible damage. It is important that the rails be placed out on the subgrade to allow for the distribution of the small material without damaging either the rail or fastenings.

No amount of later maintenance can overcome the results of a poor rail-laying job. Much too often speed in laying the rail is emphasized at the expense of quality work. We all want to get the rail laid as quickly as possible, but we should never sacrifice good work for speed. Before the rail is placed in the track, certain good practices must be followed to insure a good job.

Lubrication of rail ends to prevent frozen joints is most desirable during the time the new rail is being laid. In the process of oiling rail ends all dirt and loose mill scale should be brushed off and then heavy oil or graphite grease applied to the full joint-bar area. A little time spent doing this work properly will pay big dividends in preventing frozen joints at some future time.

The adzing of the ties by mechanical adzers to prepare a proper seat for the tie plate is one of the most important jobs in connection with the laying of new rail, and plays an important part in determining the life of rail. Great care should be used to see that all ties are adzed in the same plane and that only sufficient wood is removed to provide for the proper bearing of the tie plate.

Tie plates should be set on the ties in such a manner as to reduce to a minimum the amount of labor necessary to get them in proper position before the rail is gaged. It is not possible to obtain desirable gage and line if the rail is gaged while tie plates are cocked and tie plate shoulders are under the base of the rail.

Much damage to new rail can be avoided during the laying operation by using care and proper equipment.

Correct Joint Gaps Necessary

Proper expansion gaps must be left between rail ends to provide for the expansion of the rail due to temperature changes. Expansion tables which are used by all railroads should be religiously followed in determining the proper gap to be left between the ends of rails. Taking temperature frequently by use of thermometers is necessary so that different thicknesses of shims will be used as the temperature changes. Approved shims should always be used for this purpose; the use of barrel staves, pieces of boards, chips, or tie plugs must not be tolerated. More new rail has been damaged in its first few months of life by improper expansion allowance than by any other single cause. Lack of expansion gaps will cause rapid flow of metal between the rail ends, which results in chipped and battered joints, causes variations in gage and alinement, and sets up a hazardous condition which can result in sun kinks. Expansion gaps which are too wide cause quick battering of the rail ends, which in turn results in undue wear on the joints and fishing surfaces.

A line gage should be run at least one rail length in advance of the regular gaging crew so the tie plates can be properly lined under the base of the rail before any gaging is done. This will help to obtain good line and gage. Rail should always be lined for gaging by use of bars and never struck with a hammer.

Tightening Bolts; Spiking; Anchors

Full tightening of all bolts in the joints ahead of the gagers is important to prevent line kinks at joints. The accepted practice of tightening the center bolts first and then the end bolts, will do much towards seating the bars properly and eliminating cocked joints. Bolt-tightening machines are used on most railroads today for this operation, as they are faster and more economical than hand labor, but it cannot be said that uniform bolt tension can be had with these machines unless experienced operators are used. It is possible to overtighten the bolts if care is not used.

Spiking by hand has been outmoded by modern mechanical and pneumatic spike drivers. The use of these drivers not only produces a better job than can be done by hand, but their use lessens the danger of damage to the rail by misplaced hammer blows.

The application of rail anchors should follow immediately after the rail is gaged and preferably before any train is operated over the newly laid rail, this to protect against the running of the rail, which would tend to close or widen the expansion gaps left between the rail ends, thereby nullifying any previous efforts which had been

*Chairman of this committee was C. E. Neal, general track supervisor, Southern Pacific, San Francisco, Cal.; vice-chairman was J. E. Chubb, acting division engineer, Pennsylvania, Toledo, Ohio.

J. M. Murphy, roadmaster; H. B. Christianson, assistant chief engineer system, W. Lakoski, division engineer, all C.M.St.P.&P.

H. C. Minteer, division engineer, R. P. Scott, trainmaster, L. W. Cole, roadmaster, all C.M.St.P.&P.

made to provide for proper expansion.

End-hardened rail has been furnished to some extent by steel mills, but the present trend is to do this work in the field after the rail is laid. By hardening the ends of rails the necessity of welding joints is delayed, as this process practically eliminates chipped and battered joints. By eliminating these undesirable conditions the cost of maintenance is reduced and the life of rail prolonged.

Follow-Up Work

It is very essential to follow the rail laying with a well-defined and planned surfacing job, and when necessary, slow orders should be placed to protect new rail from becoming damaged before this work is completed. It is more important, however, to follow the rail laying gang immediately with a small gang with the proper equipment to pick up and tamp the loose and swinging ties, correct uneven surface, line and gage, straighten any tie plates that are crooked, straighten and redrive any bent spikes and adjust rail anchors so that all are bearing against the ties.

Rail cannot be maintained in good condition and surface without a good foundation. Thorough drainage of the roadbed is absolutely necessary before good track can be secured, and this problem must be given careful and detailed consideration. Side ditches must be cleaned, wet and narrow cuts ditched and sub-drains installed where necessary, and soft spots or water pockets in roadbeds eliminated by soil stabilization through grouting or by suitable sub-soil drainage or by a combination of both, before a good foundation can be obtained for a modern track structure. Subgrades should be built up to standard heights to take care of planned surfacing jobs. All of these things should be done in advance of the rail job. It is realized that there are many methods of surfacing the track after new rail is laid and the degree to which the track will be rehabilitated depends entirely upon the condition of the ballast, condition of the ties, condition of roadbed, operating conditions, density of traffic, speed of trains and importance of the line.

Importance of Cross Grinding

Rail should be cross ground as often as necessary after being laid in the track, in order to provide a space at the rail ends to accommodate the flow of metal that takes place as a result of traffic.. End-hardened rail will not require cross grinding as frequently as rails which have not had this treatment. A small cross-cutting grinder has been found to be the most economical machine for this purpose. Money spent on cross grinding is well spent for it decreases the possibility of battered joints due to lipping and helps postpone the need for welding the joints.

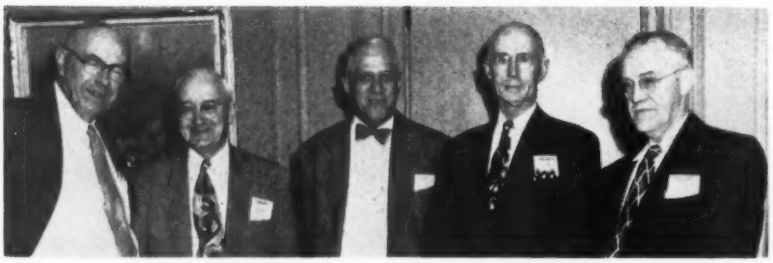
The welding of rail ends materially increases the life of rail, particularly in heavy tonnage territories. Failure to follow a well-planned program of welding results in chipped and battered joints that cause undue wear on the joint bars and fishing surfaces, surface-bent rail, bends or breaks in the joint bars, the loosening or breaking of the bolts, damage to the signal bond wires, low joints with attendant undesirable riding conditions, and materially reduces the service life of rail.

It is good practice to follow a rail gang in two to four weeks to retighten all track bolts to assure uniform bolt tension and to take up the slack resulting from the dislodgement of the mill scale on the fishing surfaces, which will provide for the proper seating of the joint bars. Joint bars improperly seated result in permanent damage to the fishing surfaces, which can never be overcome by any future maintenance. Successive tightening of the bolts should follow periodically, to assure good bolt maintenance.

Periodic reapplication of oil or grease to the rail ends and back of joint bars will eliminate frozen joints, prevent wear and provide for movement of the rail due to temperature changes. The packing of joints with preformed joint packing or graphite grease, is helpful in the prevention of frozen joints and undue wear due to sand conditions. This is especially helpful in preventing serious damage to the ends of rail laid in tunnels where locomotive gases cause excessive corrosion. Along the ocean where salt sprays are prevalent, and in streets and paved areas, the application of rust preventives, greases or oils, contributes much to extending the life of rail.

Maintenance of proper gage is of great importance in lengthening the service life of new rail. Gage should be correct as rail is laid and maintained to set standards through the life of the rail. This is not only true on tangent track, but especially so on curves. There is a very real tendency on the part of some supervisors and foremen to condone the widening of gage on curves simply because it is on a curve. With the treads of worn wheels passing over the rail where wide gage is prevalent, the inside rail is severely damaged by the outer rims of the wheels. This usually sets up a condition where the gage is further widened and the ball of the rail begins to corrugate and flow. Curves of 8 degrees should be widened progressively ⅛ of an inch for each 2-deg. increase, until a maximum of 4 ft. 9 in. is reached.

Transposition of rail on curves is carried on very extensively by many railroads. By following a well-planned program for this work, and getting it done before the rail is seriously damaged due to corrugations or flow on the inside rail, or excessive wear on the outside rail, transpositions can be made and the full life of the rail realized. To determine when a curve should be transposed is a matter of experience, and requires a full knowledge of operating conditions existing at any specific lo-



J. T. McMahon, superintendent, Railway Ballast Conditioning Corp.; E. H. Barnhart, division engineer, B.&O.; H. H. Harsh, engineer maintenance of way, B.&O.; W. R. Walters, general manager, Railway Ballast Conditioning Corp.; J. W. McGarry, president, Railroad Products Co.

cation. Generally, on ascending grades where the speed of freight trains is naturally slower than for passenger trains, the inside rail will show more wear than the outside rail, and in this case the time for transposition depends upon the condition of the inside rail. On descending grades where the speeds of trains are more nearly equal, the outside rail will wear more rapidly than the inside rail, and in this case the time for transposition depends upon the condition of the outside rail. On single track both rails are subject to approximately the same wear, depending upon the flow of traffic and the speeds of trains. The best rule to follow in any case is to make a thorough inspection and determine by the actual condition of either rail the time best suited for the transposition. Some railroads prefer to relay the outside rail only and move the outside rail to the inside of the curve. A field inspection by experienced men in this kind of work can best determine just what is required on each individual curve.

Super-elevation of curves plays a big part in the wearing of rail. Where super-elevation is excessive, the inside rail flattens out, and where super-elevation is not sufficient, the outside rail wears out. Equilibrium speeds are the most economical for wear on rail and equipment, and when track is elevated for the equilibrium speed of trains, the most desirable wear on rail is obtained. Much study and thought should be given to the correct super-elevation of curves to meet operating conditions and, wherever possible, the super-elevation should be reduced to the point where it most closely meets desired speeds of all trains. By doing this, excessive wear on the rail is reduced, excessive maintenance costs are held down and, finally, the hazard of derailment of slow-moving trains travelling over curves which are heavily elevated is held to a minimum. It may be necessary in some cases to restrict the speed of faster trains so that a medium can be had between all classes of trains, and the curves super-elevated accordingly.

Flange Lubricators Helpful

Installation of modern rail and flange lubricators has proven over a period of years to be very effective in extending the life of the rail laid on the outsides of curves. They have also proven to be beneficial in reducing gage problems, reducing wheel flange wear, and reducing hazard of derailment due to wheels climbing the outside rail. Prior to the installation of lubricators, frequent renewal of the rail on the outside of curves was necessary before the inside rail was ready to change out. With the use of these machines, the life of the outside rail has been extended until in some cases it is as much as double that of the inside rail.

Where continuous-welded rail is being used it appears to be giving satisfactory service. Good maintenance practices are of course just as necessary on continuous-welded rail as with rail of standard lengths, if its full tonnage life is to be realized. There is a very definite advantage and savings to be realized by the use of this rail at most locations, but particularly so when it is used in tunnels, street crossings, station platforms and other paved areas where the cost of joint maintenance is excessive.

A practice being followed by some railroads today of releasing rail on tangent track or in light-curve territory before it has reached its full tonnage life, for the purpose of relaying this rail in heavy-curve slow-speed territory, is proving to be worth while. It is a fact that this cold-rolled rail will last longer on heavy curves than new rail, and several railroads have been prompted to adopt this as standard practice.

Subjects touched on briefly in this report are all practices which have been developed in the past and are not by any means novel or new. The problem today is not so much in devising new ways and methods of giving proper care to new rail, although these should always be sought, but rather the problem is one of stricter adherence to existing standards and practices which have been developed through many years of experience. Rail suppliers, in cooperation with those engaged in rail research, have made excellent studies and developed practices in producing rails that are less susceptible to transverse fissures and other defects. Companies which manufacture track machinery, supplies and appliances, are constantly carrying on studies and experiments with the idea in mind of designing new products as well as improving the quality of old products, with the objective of making track maintenance simpler and more economical.

Finally, any work of maintenance that tends to produce good-riding track, such as good ballast, good ties, good surface, stable subgrades, drainage, and any thing else that constitutes good maintenance of track, will go far toward increasing the service life of rail. Thoughtful planning, careful supervision, and conscientious training and instruction of all involved personnel, are most necessary if we are to reach the goal we seek.

DISCUSSION

In reply to a question from President Halverson as to whether rail should be unloaded singly, by magnet, or by other means, A. H. Whisler (P.R.R.) replied that about 90 per cent of their new rail is unloaded from gondolas by cranes, using rail tongs to handle single rails. Most of these rails are placed alongside the track while the work train is still in motion. However, the movement of the train is not continued at the expense of not getting the rails near their actual points of use. Mr. Whisler also warned of the danger of allowing green men to unload tie plates and other track fittings in a manner that will damage the rail. In this connection, he mentioned specifically the dropping of tie plates and sometimes angle bars directly on the rail with the possibility of nicking the base of rail. Because of the possibility of such damage, he said rails should be placed in such a manner as to allow for the safe unloading of rail fittings.

In reply to a question from President Halverson as to whether new rail is end-hardened immediately after laying, A. D. Alderson (Soo Line) stated that in signal territory their rail is given end-hardening treatment within 24 to 48 hr. after being laid. Outside of signal territory it is end-hardened

within a month. Mr. Alderson asked for comments from other members as to the effect of end-hardening on grease cakes and other lubricants applied to the joint area when the rail is laid.

W. M. S. Dunn (N.Y.C.&St.L.) reported that it is their practice to end harden their rail with a high-frequency electric method which, so far as he has been able to determine, has no effect on the grease cakes. F. H. McKenney (C.B.&Q.) reported that in end-hardening their rail by an oxy-acetylene method within one week to 30 to 40 days, they get no harmful effect from the "frying out" of the grease. W. W. Fannon (N.Y.N.H.&H.) said that they cross grind and end harden their rail immediately after it is laid. In this way they are now end-hardening the rail before the application of insulated joints. From this many benefits are being derived.

Considerable discussion then followed on the transposing of rail, with many individual members relating their specific manner of doing the work but all agreeing on its advantages. Chairman Neal closed this part of the discussion by reciting the economies of their system of transposing rail on curves in mountain territory, stating that they even re-transpose rail in some cases. W. J. Salvage (T.&P.) asked the members for comments on the causes contributing to rail-end failures, specifically mentioning the burrs that are left after sawing the rail and drilling bolt holes. J. R. Zandra (Colorado Fuel & Iron) replied that an extensive investigation of this problem is now in progress under the direction of the rail committee of the A.R.E.A. He said that there is no denying that burrs are left both on the end of the rail and on the bolt holes, but the effect, if any, that this has on rail failures has not yet been determined.

Proper Operation and Maintenance of Roadway Machines and Work Equipment

Report of Committee*

• With the ever-growing number of machines employed in the maintenance-of-way departments, the proper operation and maintenance of this equipment, as well as the selection of the proper machine for each phase of work, is one of the most important subjects for study. The introduction of the 40-hr. week, and the continued rising cost of labor, place more emphasis on the importance of obtaining the greatest production and efficiency from all types of equipment.

The progressive mechanization of track work has resulted in the use on railroads of much equipment which was at one time considered adaptable for use only in contractors' work. Now, all types—both on and off-track cranes, tractors, bulldozers, ditcher - spreaders, trucks, automotive equipment of many types, shovels, draglines, front-end loaders, graders, wheeled tractors, power mowers, chemical sprayers, and conveying equipment —are household items in the maintenance department. In addition to all these, many specialized machines have been developed for track work, some of which are track motor cars, highway-rail vehicles, power tampers or ballasting machines, power track jacks, cribbing and ballast-cleaning equipment, ballast cars, tie-handling equipment and cars, tie-removal and inserting machines, track-cleaning machines, snow-removal and handling equipment, and rail-laying machinery, such as spike pullers, power wrenches, adzers, creosote sprayers, tie-plate spacers, small cranes, gaging equipment, spike setters and drivers; also welding and grinding equipment, rail saws and drills.

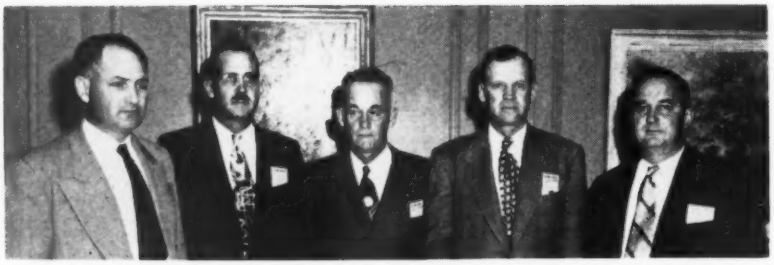
In order to get dependable service from power equipment with the least maintenance expense and to obtain full benefit from it, everyone involved in its use must be educated with respect to its proper operation, maintenance, capabilities and limitations. If this can be and is done, the investment in equipment will pay great dividends in the production of more and better work and reduced equipment repairs. There are now available almost unlimited resources of educational material for use in such training. In addition to parts books and instruction and operating manuals which manufacturers issue with new machines, many of the builders or distributors of equipment have sound motion pictures which quite completely show the important phases in the lubrication, care and operation of their equipment and the different types of work for which they are adaptable.

The time has passed when the satisfactory training of operators and mechanics consisted only of long "apprenticeship" to a particular machine or type of machine. A good example of what can be accomplished with a definite educational program is the training course which most roads have carried out in connection with the change over from steam to diesel motive power. Positive action should be taken to encourage the men to get all possible knowledge of the principles and practical application of the available equipment.

Along with the importance of having the operators and maintenance men fully qualified, it is equally vital that the roadmasters or supervisors have complete understanding of the equipment placed in their charge. This is essential so that the planning of the use of the machines may be fitted in to the general programming of the work, and to insure that the proper equipment is in working condition and available at the proper time and place. It is also essential for the supervisors to have this knowledge so that they may be qualified to supervise the operators. Although in some instances it may be difficult or impossible to control the assignment of operators, much can be accomplished by the roadmaster or supervisor if he will take a personal interest in the performance of machine operators and encourage them to stay with machines to which assigned, seniority permitting, and not jump from machine to machine.

In any discussion of the proper use of roadway machines one of the most important considerations is that of keeping the equipment in working condition. First of all, there must be preventive maintenance. Correct lubrication, field adjustments and light running repairs extend the life of machines greatly and prevent breakdowns between programmed shoppings as well as reduce the cost of overhauling them when they are shopped. The scheme for accom-

*Chairman of this committee was P. E. Belley, roadmaster, Canadian National, Cochrane, Ont.; Vice-chairman was R. B. Manion, engineer maintenance of way, Great Northern, St. Paul, Minn.



C. E. Neal, general track supervisor, E. R. Leonard, roadmaster, J. V. Copeland, roadmaster, J. J. Kennedy, roadmaster, J. S. McCauley, assistant division engineer, all S.P.

ployees are good workers and produce more work than those that do not work safely. Safety must be taught and practiced constantly to obtain the desired results. It does not come automatically and it can be lost quickly if control is relaxed or attention to it is decreased.

The maintenance force, therefore, should be made up of men properly qualified for their jobs and carefully selected and trained. The employment of a better class of men, the proper education and supervision of these men, and the dismissal of those who prove to be unreliable and incompetent—all these measures tend to build a maintenance force capable of producing more work than the complete disregard of the personnel problem.

To carry out a maintenance program effectively the various subdepartments of the maintenance department have to cooperate fully with each other, and their activities must be coordinated by the proper maintenance officer. If coordination is properly handled, cooperation will result. Too often the track supervisor has his weekly program disrupted by a sudden demand from the signal or B&B department for labor to assist in some project or a request for work train movements not previously anticipated. Likewise the track supervisor should not expect to have assistance on short notice from the B&B department or the signal department on some project he has that has not been planned out ahead of time. Jobs involving cooperation between these departments should be planned and properly coordinated as far in advance as possible.

Cooperation with the transportation department is also of utmost importance. Anything that can be done to produce more productive time of maintenance forces will reflect in decreased divisional operating costs. Diversion of traffic to other tracks, close spacing of extra trains to regular trains, bunching of light power movements, calling of extra trains during hours when maintenance forces are not at work, and proper attention to maximum working time of work trains are all factors which the operating department can control in order to give maintenance forces maximum working time and thus increase production.

The desired cooperation can be obtained if the proper maintenance officer coordinates the activities of his department, and the work is planned ahead. Often the transportation department is criticized for not cooperating by diverting traffic on a day when there is a heavy run of trains. This could probably have been avoided if the job had been planned for some other day when traffic was not so heavy. On the other hand many more hours of production could often be obtained if the transportation department would make diversions on days when the flow of traffic permits.

This subject is of vital importance in performing mechanized surfacing and is one that warrants the attention of the top management of the railroads. Large capital expenditures are being made for all types of mechanized equipment which should be kept busy every available minute. Several gangs of men are generally grouped into one big force to work with these modern surfacing machines or with rail-laying machines. It is very important to keep these forces busy in order to get as much production as possible. Therefore, the cooperation of the transportation people is essential to increase productive time, and the responsibility for obtaining it lies with the proper maintenance officer on each road. There should be no difficulty in obtaining this cooperation on any well-managed property.

The programming of work is of utmost importance and should be done well in advance. This should start at the top where allocations for rail, ties, ballast, etc., are made far in advance of the working season. These allocations made on a system level can be handed down to divisions and the exact amount of the material that is to be used can be counted on. The maintenance program can then be formulated. No supervisor can intelligently plan a program for maintenance unless he knows what material he is going to have. Out-of-face surfacing programs depend directly on rail and tie allotments and cannot be made up properly unless the allotments are known.

Advance planning as much as five years in the future should be carried out particularly with respect to bridge and building maintenance and drainage projects. This can also be carried into track-department programs in a general way, if allotments remain fairly stable. These long-range programs serve as a guide to more detailed yearly programs which are then broken down by the supervisors to the foremen in weekly and monthly elements. The foremen then should plan each day's work so as to gain the most from the force that he has.

When possible foremen and supervisors should be consulted in preparing a program for work that they will handle. By giving these men a voice in the plans it instills in them more interest in the work and gives them the initiative so necessary for the success of the program. Work schedules and programs should be kept reasonably within the limitations of what can be accomplished, although goals should not be set too low.

Training Programs for Foremen and Prospective Foremen

It is necessary that foremen be capable of accepting the full responsibilities of their assignments. They must be taught the proper techniques in the use of tools, in the handling of materials, and in safety, and their responsibilities and obligations to the men under them and to their supervisors must be made clear. The standard plans, operating rules, maintenance-of-way rules, instructions and specifications must be explained and kept constantly before them.

To accomplish these results, classes for foremen and prospective foremen should be held. These classes should be made as interesting as possible; visual aids should be used and practical demonstrations made of topics discussed in theory. They should be conducted in a simple manner so that the subject matter can be easily understood by those in attendance.

A real interest should be shown in all men who demonstrate leadership abilities. They should be encouraged in their work, given on-the-job training and invited to attend the classes of instructions.

The committee recommends that training programs for apprentice or student foremen be set up and vigorously carried out so as to have men always available with the proper qualifications to fill foremen vacancies. Proper training of these men will result in increased productivity of the men under them when they become foremen.

The supervisor should spend considerable time in planning the force organization for a particular job. He should consult some of his best foremen and benefit from their experiences. Once the job is organized and under way he should check constantly to see if the organization is producing the desired results and, if not, changes should be made to complete this. Productive time is certainly dependent on the proper organization.

The work to be performed by a work train should be very carefully planned. It should be set up in proper order so as to allow the train to progress along the line and accomplish the various items of work in sequence. This will require advance arrangements to insure the material being at the location required and avoid unnecessary work-train miles running back and forth for materials. Flexibility in the set up should be made so as to allow the person in charge to move on to another job in case he gets blocked at one point by traffic. Good work-train performance can only be obtained by giving it adequate and detailed supervision. To get the most out of the hours the train is on the road requires careful planning of the work.

While production in work-train service is being strived for, a good job must not be sacrificed. Too often the idea of releasing so many cars or getting the train in at a certain time seems to be the yardstick of good performance. This is not so. It is far more economical to unload 5 cars of ballast properly than to unload 10 and have the track forces faced with a heavy job of equalizing by dolly or ballast boards. Proper work-train distribution of materials can save many man-hours of maintenance labor.

The supervisor should know his men and take an interest in their affairs. He should render any assistance possible to them in any manner he feels that he can be of help. They should feel that he is the one to whom they should come with their problems rather than shy away from taking questions to him. Employees that are happy and content in their work will naturally produce more than those that are always grumbling about something.

M. U. Heaton, assistant roadmaster, F. E. C.; R. R. McEnery, division roadmaster, G.N.; R. A. Jackson, division engineer, M.C.; H. W. Dunn, track supervisor, F.E.C.

Foremen who have differences and peculiarities should never be placed together to work on a job, because the lack of cooperation will be reflected in decreased production.

Working agreements should be followed and sharp practices avoided. Good discipline and morale must exist and infractions of rules must be handled for correction in the manner prescribed by the agreements.

Camp trains and labor-camp forces must be given good living accommodations and located at places which they can get to by train. They should be provided with adequate sanitary facilities.

Credit for a good performance should be given as readily as criticism is handed out for a poor performance. Men will produce more and do a better job if they know that the work they are doing is appreciated and recognized.

Prevention of Wasted Man-Hours

This prevention of wasted hours is a most important item. Supervisors should make time studies of various operations, particularly the travel times of gangs. Such studies will often develop the economy of using highway vehicles in traveling to and from work. Also it might be found that a change in starting time would result in saving man-hours, especially when train operation interferes with the movement or work of a gang.

Foremen should be watched as they plan their work and those that indicate that they cannot plan intelligently should be assisted. Nothing wastes time more than jumping from one job to another during one day's operations, with costly travel or non-productive time in between each move.

Careless distribution of materials by work trains should be corrected so as to save man-hours in the forces using the material. Crossties down embankments, bridge or culvert materials too far from the point of application, or poorly unloaded ballast, all can cause many man-hours to be wasted merely getting the materials in the proper place for installation. These wasted hours are non-productive and need to be entirely eliminated in order to give an equal amount of time in productive maintenance.

A high standard of maintenance can do much to eliminate wasted man-hours by putting an end to non-productive "trouble shooting" or "patch work". If a force of men ever gets into the habit of doing a "patch job" they will soon have their territory in such shape as to require daily trouble shooting and a thorough job will become impossible because of more trouble elsewhere. This kind of a situation can have a bad effect on the morale of the men and should be corrected.

The use of safe methods, the adoption and implementation of a safety program, and the elimination of personal injuries are a large factor in the reduction of wasted man-hours.

The selection of the machine or tool that will best fit the task is the responsibility of the supervisor, and failure not only wastes man-hours and machine-hours but is detrimental to employee relations. Machines in need of repairs can cause a lot of non-productive time by forcing the operators constantly to make field repairs that rightly should be done in a central shop. There is often a tendency actually to lose time awaiting the arrival of a machine to do a job that could have been done by hand labor just as economically. On the other hand if machines can save hand labor they should be used and the logistics of their availability must be planned in advance to insure the most production from both the machine and the men it releases.

Some machines are readily adaptable to any railroad, while others may do an excellent job on one road and not be as useful on another. The purchase of power tools and machines must be carefully planned and studied in detail before actual orders are placed. Tools that are in use on another

J. P. Todd, district roadmaster, F. A. Anderson, district roadmaster, A. P. Ryding, roadmaster, J. L. Stephens, district roadmaster, R. R. McEnery, division roadmaster, D. J. Middleton, district roadmaster, C. Halverson, general roadmaster, L. G. Reichart, office engineer, R. Manion, engineer maintenance of way, H. Prasses, district roadmaster, R. A. Krona, roadmaster, K. A. Enger, roadmaster, all G.N.

road should be inspected prior to deciding on a purchase in order to insure adaptability. For example, on a multiple-track railroad a large power tamping machine will do an excellent job, but on a heavy-traffic double-track line one of the smaller machines that can be removed from the track very easily may prove more productive.

Thorough planning not only is required in the application of power tools and machines but also in the actual purchase of these machines. If this is done more productive time of the forces using this mechanized equipment will result.

On many railroads rules governing the operation of track cars should be brought up to date in line with present-day conditions and the greater necessity for conserving man-hours. In some instances such rules were developed many years ago to meet conditions that no longer obtain. The development of radio, portable telephones, block indicators and the use of positive line-ups offer possibilities for expediting the movement of track cars with equal or greater safety than now exists. If traffic has become dense and modern two-way signaling has been installed, the elimination of track cars entirely might be advisable in favor of the use of trucks on parallel roads constructed on the right of way. This is a situation that requires much studying and planning in order to arrive at a solution which will increase man hours of productive maintenance.

In summary, it is found that detailed and intelligent planning is required in:

(1) Selection, employment and training of new men.

(2) Cooperation and coordination between various departments.

(3) Advance planning and programming of maintenance work.

(4) Providing training programs for foremen and prospective foremen.

(5) Organization of forces.

(6) Work train operations.

(7) Good labor relations.

(8) Prevention of wasted man-hours.

(9) Proper application of mechanized tools.

(10) Operation of track cars.

These items are a challenge to every maintenance officer to employ each one vigorously with all the technical skill he has in order to increase by every available minute the productive hours of work of his maintenance forces.

On Wednesday a large group observed the laying of welded rails on the E.J.&E.

DISCUSSION

In opening the discussion, H. W. Kellogg (C.&O.) pointed out that it is essential to secure the fullest cooperation of the operating department in planning the work of major maintenance jobs. Some of the operating men do not understand maintenance-of-way problems, but when they do they usually give full cooperation. For that reason Mr. Kellogg said that the problem evolves itself into selling the operating men on the merits of M/W work. He felt that there were three essential sales points that could be used effectively in dealing with operating people.

One of the selling points is cost. He said that when an M/W man can tell his operating people that an hour's delay is costing so many dollars in lost time and wasted motion, the figure is so high that his audience is bound to be impressed.

The second selling point is to point out that, by losing time, it will take the maintenance forces longer to do the work. Most operating men will do almost anything to get large maintenance gangs "out of their hair" as soon as possible. By cooperating to the fullest extent, they have found that their troubles are over sooner.

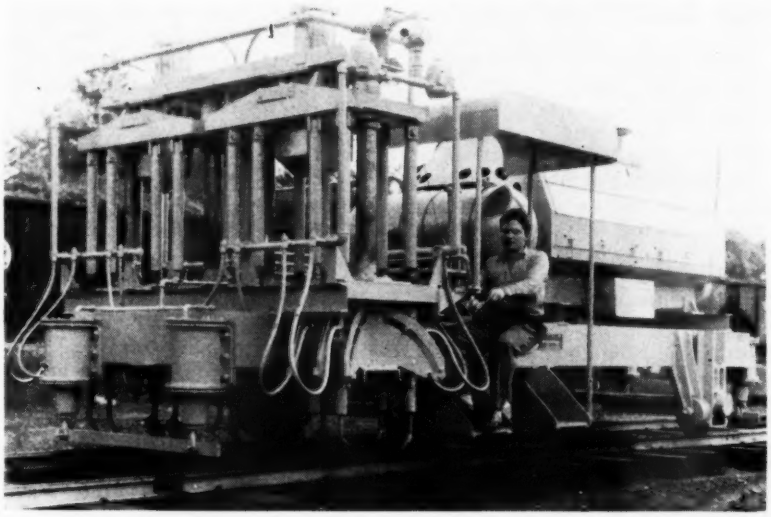
Finally, it always pays, according to Mr. Kellogg, to have a meeting with the operating people and discuss the details and scheduling of the work. In that way each man will know what has to be done and when it should be accomplished.

R. G. Simmons (C.M.St.P.&P.) then told of their system of handling major maintenance operations on a large scale. After they lay rail, the track is immediately reballasted. Because the operation is so large and involves so many men, delays are very costly. Therefore, the planning work must be accurate and in considerable detail.

PRODUCTS OF MANUFACTURERS

New, improved equipment, materials, devices

(For additional information on any of the products described in these columns, use postcards, page 871)



BALLAST TAMPER

THE Railway Maintenance Corporation, Pittsburgh, Pa., now has in production a new tamping machine, designated as the McWilliams Multiple Unit Air Tamping Machine, which uses the same tamping principle as this company's larger HR Tamper placed on the market last year. The new machine has a battery of 16 air tampers which are arranged in two groups of 8, each centered over a rail. The two groups can be operated simultaneously or independently.

The entire operation of spotting the machine over the ties and control of the tamping action is handled by one man. It is said that the machine can be spotted from one tie to another in two seconds, and three to five ties per minute can be thoroughly tamped, depending on the size of the ballast and the amount of the raise. A finished job of tamping is said to be secured with track raises of from one to five inches where the track is raised to grade ahead of the machine by independent jacks, although joints can be picked up and general spot surfacing can be done with or without jacks. The independent operation of the two groups of tampers makes it possible not only to tamp slued ties, by tamping one end and then moving the machine for tamping the other end, but also to pick up low joints.

Means are provided for adjusting the position of the tamping tools with respect to the bottom of the tie and for the height of the various rail sections and the track raises. Tamping tools operate at an agnle of 30 deg. with the rail in a fixed cam-controlled path. Full tamping strokes bring opposed tools within 2½ in. of each other under the ties, filling and compacting the ballast for a distance of 16 in. outside and 12 in. inside of the rails in addition to the spaces under the rails.

Controlled pressures up to 700 lb. can be obtained on each tool, and a push-rod to each tamper contains a pre-loaded spring for equalizing the pressure on each of the 16 tools, thus producing uniformity of tamping. This method of mounting and controlling the tamp-

(Continued on page 948)

In the August issue, in connection with an item describing the new Model 566F heavy-duty motor car now being offered by the Northwestern Motor Company for the use of bridge and building crews, there was inadvertently presented a picture of an older model instead of the Model 566F. The correct picture is shown above.

WHAT'S THE ANSWER?

An open forum for maintenance men on track, bridge, building and water service problems

Chisels on Snow-Broom Handles?

To what extent should the handles of snow brooms be equipped with steel scrapers for the removal of snow, ice and dirt from switch points and other locations? Why?

Needed for Light Switches

BY CANADIAN DIVISION ENGINEER

Some years ago it was the practice to equip "switch" brooms with a small steel scraper to remove accumulated snow and ice from around the switch points and frogs. For one reason or another the brooms are no longer equipped with these scrapers. If correctly applied to the handle of the broom, they are an asset under certain conditions. If not well constructed, they soon loosen on the handle and are of little value. If the ice is very thick they do not perform successfully.

No matter how well a switch point is cleaned, there is a tendency for snow to be packed between the switch points and stock rails. Use of the switch will pack any loose snow into a very hard mass. If there is alternate thawing and freezing, there is a chance of ice forming at these points.

With the lighter weights of rail, say up to 85 lb., there is a tendency for the switch rail to ride up on this compacted snow or ice so that it sticks slightly above the running rail or stock rail. If condoned, this will result in damaged switch points and perhaps something more serious. Steel scrapers on "switch" brooms are well adapted to remove this layer of hard snow and to a certain extent to remove the ice.

With the heavier weights of rail it has been found that there is not the same need for the scraper because the switch points do not have the same inclination to ride on the layer of snow. Yet, in certain cases, the scraper is convenient.

The greatest use for these scrapers, therefore, is at points where a light weight of rail is used, but under certain conditions they can be used at any location where there is a tendency for snow to pack between the points and stock rails and around the frog.

Chisel Points Are Essential

BY WILLIAM LINDSEY

Yard Foreman, Chicago & Illinois Midland, Pekin, Ill.

Equipped with steel scrapers, snow brooms become two tools in one, because they can be used for either sweeping or scraping. Cleaning ice, snow or dirt from switches and other locations, this minimum tool-load means much to the maintenance man who must patrol extensive yard tracks or sections during inclement weather.

Snow brooms without scrapers have proven both inadequate and inefficient, because sweeping will not remove all snow, ice and dirt from affected places. A metal scraper is needed, and having it as a part of the broom minimizes the load the maintenance worker must carry, besides eliminating the added expense of a makeshift scraper that would have to be carried.

It's not necessary that the scraper be made of the best metal, but only serviceable enough for the life of the broom. However it should have sufficient strength to withstand the heaviest pressure necessary, and for best results it should be sharpened to facilitate

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Answers to the following questions are solicited from readers. They should be addressed to the What's the Answer editor, *Railway Engineering and Maintenance*, 79 W. Monroe St., Chicago 3, and reach him at least 30 days in advance of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you may wish to have discussed.

To Be Answered In the December Issue

1. To what extent, if any, has experience with the repair of driver burns by welding justified the continued use of this practice? What precautions have such experiences indicated are necessary? Explain.

2. What are the most effective methods of keeping employee locker rooms and washrooms free of rodents and roaches? To what extent do structural features have a bearing on this problem? Explain.

3. How should snow-fighting forces be organized to service remotely controlled switch heaters at interlocking plants? At C.T.C. switches? How many men, if any, are necessary?

4. What are the advantages and disadvantages of prestressed concrete for railway bridges? Explain. To what types of structures is it most adaptable? Why?

5. Under what conditions, if any, is it desirable to apply braces against the rails where track has been shimmed because of frost heaving? What precautions should be observed in applying such braces to assure maximum effectiveness? Explain.

6. What are the relative advantages of remote push-button stations and automatic pressure systems for pumping lubrication oil to diesel locomotives? What are the characteristics of each method? Explain.

the quick removal of ice. Short of applying heat it's practically impossible to remove ice from switch points except by scraping with a sharp instrument.

We have received snow brooms equipped with scrapers of a superior grade of metal, which was unnecessary and expensive. All that is needed is the roughest kind of metal, serviceable only during the life of the broom. For want of a better name, I call it blacksmith metal. The finished product resembles a piece of metal the blacksmith might have drawn out in his forge.

The following questions might arise. Is it neccessary to have all snow brooms come equipped with scrapers? Why not buy half with scrapers and half without, or any other ratio so desired. This would realize questionable savings. For instance, when the worn broom ceased to be serviceable there would be the added expense of changing the scraper to the new broom. If longer life for your broom was the reason you purchased them in this ratio, you would have to carry along two brooms, one with a scraper and one without——a distinctly undesirable arrangement.

During the past winter, I have had the opportunity of making several tests of brooms along these same lines, just to observe the advantage or disadvantage of such an arrangement. We found it took an average of one hour to change scrapers from the worn broom to the new, making the point serviceable, drilling holes, etc.

After using many methods of removal, we found it was advisable to remove the entire handle, including the scraper, from the worn broom, because it was quicker and eliminated the possibility of breaking the scraper in removing it separately. After repeating the same performance with the new broom, we installed the old handle complete with scraper, on the new brush, using ¼-in. by 1½-in. stove bolts to hold the handle firmly in place. On numerous occasions there was the added chore of sharpening the used scraper, besides boring many holes before these stove bolts could be inserted in the new brush.

What if snow brooms were not equipped with scrapers? How could packed snow and ice be removed from switch points and other places? Years ago, picks, shovels and even bars were used, pounding and scraping until all ice was removed—an arduous, tiresome and expensive task. Then some one had the bright idea of taking a gas pipe, slipping it down over the end of the handle of the broom, flattening the open end as much as possible and sharpening it to a chisel point. From this crude tool was undoubtedly fashioned the scraper of today.

Another very important use of the scraper is removing sand and dirt from switch points and slide plates before oiling. Sand and dirt, mixed with oil, makes moving parts hard to throw and only by removal of the obstructing material with a scraper, then sweeping, can such parts be made to throw more freely.

Already burdened with an oil can and a brush, a man oiling switches welcomes a tool that will lessen his load, make his work more efficient and more effective.

What Equipment For Ditch Work?

What type of work equipment is best suited to ditching and maintaining ditches along the right of way? In earth cuts? In rock cuts? In level country? Explain.

No Machine Fits All Cases

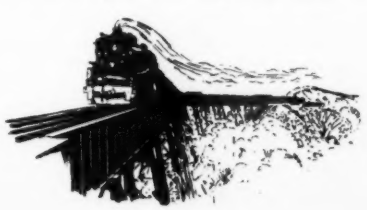
By R. E. Berggren
Supervisor, Maintenance of Way Equipment, Illinois Central, Chicago

Where conditions permit, the cutting of new ditches and the maintenance of old ones are best done by Jordan spreader-ditchers. On these machines the ditch-cutting and the bank-sloping wings may be set to provide a uniform berm, ditch and bank slope, with the berm and the ditch bottom maintained at the desired distance below the top of the rail. The gradient, naturally, will then be the same as that of the rail.

In earth cuts the material is carried out and wasted at the end of the cut. Where there is a considerable amount of earth to be removed, the bank sloper may be adjusted to a carrier wing, greatly increasing the dirt-carrying capacity of the machine.

Where long cuts have overhead bridges or other obstructions to ditcher wings, the machine accumulates the dirt at the obstructions for its quick loading into air dump cars by use of crane and clamshell bucket or shovels mounted on flat cars. The finishing may then be done by hand.

In some instances the material removed from earth cuts may be required for widening fills or for other purposes. In these cases, shovels mounted on flat cars are used to load the dirt into dump cars. Two or more such ditching units may be used in a train. To level the windrow of dirt left on the fills by the dump cars and to dress and clean the ditch made by the shovels, the work train should also include a spreader-ditcher.



In rock cuts small tractors with dozer blades or front-end buckets are sometimes used to accumulate material for removal by shovels on flat cars. In most cases, however, the shovel and dump-car outfits are used to advantage by removing the material from the ditches direct, without the use of tractors or other equipment.

In level country it is often desired to have the ditches farther from the track than it is possible to cut them with a spreader-ditcher wing. In such cases a modern, heavy-duty motor grader with fully adjustable blade should be used. With this machine perfect slopes and ditches can be made at low cost even though a considerable amount of dirt moving is involved.

In some cases it may be advantageous to clean ditches in cuts from the top of the bank. This type of work has been done with considerable success by a crane pulling a dragline bucket up the bank and loading the material into dump trucks or wasting it if the cut permits.

No single-type of machine is

adaptable to all types of ditching, but once a ditch is properly made by a particular machine, the ditch can be easily and economically maintained by the same type of machine.

Various Methods Used

By W. S. Brown
Assistant Maintenance Engineer, Baltimore & Ohio, Baltimore, Md.

Adequate drainage, which is one of the most important single items of roadbed maintenance, depends largely upon keeping the ditches along the tracks open. It is difficult to say just what type of work equipment is best suited to all ditching, as roadway conditions vary considerably. Where clearances permit, the use of off-track equipment will prove to be far more economical than on-track equipment. However, in many places, such as narrow rock cuts, it is impractical to use off-track equipment, and locomotive cranes or other methods must be employed.

Some railroads are engaged in cut-widening programs, not only to improve drainage, but to provide increased clearances to make possible the operation of more efficient off-track ditching and other equipment. As this program progresses, the problem arises as to what type of new equipment to purchase for replacing the old methods so that full benefit can be realized from the improvement.

Bulldozers and "bullclams" have proved highly efficient in maintaining ditches along main lines in level or rolling country. On branch lines where rail traffic is not heavy, a spreader car can be used to good advantage.

In mountainous country where the railroad generally follows a river, ditching can often be done cheaply by a crawler crane working along the tracks. Equipped with a boom long enough to cast across the tracks, such a crane can widen the fill on the river side. Where side clearances restrict the operation of a crawler, it may be necessary to use a locomotive crane or ditcher. However, the use of work trains must be kept to a minimum.

In earth cuts, a bullclam can be used with or without dump trucks if clearance is sufficient, otherwise a spreader car does very well. Sometimes working these two pieces of equipment as a team produces excellent results.

The same off-track equipment can be used in rock cuts where clearance is sufficient. In narrow rock cuts the problem of ditching is not solved as easily if it is desired to avoid the use of work trains. One method which has proved very economical is the contract hiring, on an hourly basis, of a man with a horse and scoop.

There are many locations in narrow rock cuts where hand methods of ditching will prove more economical than loading the material in cars by work train, especially if it is necessary to remove very little material to keep the ditches open.

How to Repair Pipe Culverts

When joints of cast iron or concrete pipe culverts become separated under main tracks, how can effective repairs be made? Explain.

Handle Each Case Separately

By Walter L. Young
Assistant Chief Engineer, Norfolk & Western, Roanoke, Va.

We do not have any fixed rule or formula for repairing culverts where the joints have become separated. Our procedure is governed by conditions existing at the particular culvert. In the majority of cases in which the pipe joints have pulled apart, the trouble is caused by earth pressure against the headwall on the downstream end of the pipe. To correct this, we remove the headwall, jack the pipe back together, and then leave the headwall off. This method usually proves satisfactory in keeping the joints from separating again.

In some cases we excavate the fill and build a collar around the open joint. Where the fill is shallow, we uncover the entire culvert and relay it. If the pipe is in a hillside fill and too deep and costly to excavate, we lay an entirely new culvert at a higher elevation on the outlet end.

Where it is impossible to stabilize the fill to hold any kind of pipe in place, we lay an entirely new culvert on a concrete base 18 to 24 in. thick, about 12 in. wider than the diameter of the pipe, and reinforced with scrap rails or reinforcing bars. We have found this method very effective in holding the joints together.

Relocate on Stable Ground

By J. C. DeJarnette, Jr.
Chief Engineer, Richmond, Fredericksburg & Potomac, Richmond, Va.

We have had several cases of this kind of trouble and I have found that all have been caused by unstable subgrade. We have tried placing stringers under the track, digging the pipe up and relaying it on concrete or timber mats. This has not been a very effective means of repair as the cause of the trouble, namely, unstable roadbed, has not been corrected by it. Under such circumstances the most effective way to make permanent repairs is to relocate the entire culvert on stable ground, if a careful survey of the surrounding territory determines such stability exists.

Better to Install With Care

By John G. Hendrickson
Research Engineer, American Concrete Pipe Association, Chicago

Making effective repairs on concrete-pipe culvert joints that have opened after being installed under main-line tracks presents difficult problems. We believe it better to avoid such difficulties by taking all reasonable precautions during the installation.

The separation of pipe joints under an embankment is usually due to differential settlements. Where such settlements are expected, it may be well to camber the pipe when it is installed. Since settlements are usually greater near the center of an embankment, the tendency will then be for the cambered pipe to be straightened and the

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joints to be closed. However, it is usually not good practice to camber the culvert to the extent that the center is higher than the inlet, for if settlements do not take place as expected, the culvert will not drain well.

It is possible in manufacturing concrete pipe to have anchored in the pipe wall at each end and around the outside, a series of bolts and lugs, so placed as to enable one pipe section to be bolted fast to another. This can be done as the pipe is installed and the fittings can be covered with concrete to protect them from corrosion. However, such pipe sections are expensive to make and to install and are very rarely used.

There are numerous other precautions which can be taken to help prevent large differential settlements. One of these is to stabilize the sub-base of the embankment. Another is to install the pipe on a reinforced-concrete cradle. However, it is impossible in every case to prevent joints from opening up, and some means of repairing them must be devised. In all cases, the method must fit the problem and one that is effective at one installation may not be feasible at another.

Before attempting to repair the joints that have separated, an effort should be made to discover what caused them to open. If the cause is determined to be differential settlement, there is no point in repairing the joint unless it is reasonably sure the settlement will not continue, or unless some effort is made to prevent it from continuing. Pipes driven into the embankment, either from the top or from the side, to a region adjacent to the pipe may be used to carry cement grout under pressure to this regeion and thus stabilize it against further settlement. If settlements have caused low points along the pipe line profile, it is often possible by means of the hydraulic pressure of the grout to raise the pipe to its original position. This, in its self, may help close some of the joints. The hydraulic pressure of the grout will cause all the voids around the exterior of the pipe to be filled and will even squeeze into the joints of the pipe itself. But to insure that the joints are completely filled with grout and hence become water-tight it is necessary that a man be able to get into the pipe to examine all joints and to touch up spots which are not filled by the cement grout. Thus a good repair job can only be effected by grouting along a pipe that is large enough to permit access to the joints. For pipes of very small diameters, grouting may improve things considerably, but it may not be possible to repair the joint completely.

The above discussion is based on the assumption that the joint openings are small and that the adjacent pipe sections still are in contact with each other. Earth movements may be such as to cause a complete separation at a joint of several inches. For instance, during the construction of a 61-ft. fill above a 36-in. reinforced-concrete culvert near Aberdeen, Wash., a slide occurred which pulled the pipe line apart for about 8 in. at one joint and resulted in the pipe line on one side of the break settling about 18 in. below the established gradient. In this case it was necessary to construct a special form in the pipe so that concrete could be poured around the opening to make a special, cast-in-place section to fill the 8-in. opening.

The above discussion represents the experiences of the concrete-pipe industry with culverts under railroad and highway embankments. One further point on which we feel rather strongly is that, in many instances, joint failures may be prevented by making every effort to insure a properly constructed joint during installation. A leaky joint, permitting infiltration and the subsequent washing away of the fill material around the joint, may result in settlements which require expensive repair work that could have been avoided had the joint been properly constructed.

Calk With Lead Wool

By Thomas F. Wolfe

Managing Director, Cast Iron Pipe Research Association, Chicago

In the event that joints of cast-iron pipe have become completely separated, the repairs should be made by using an internal sleeve fitted to the inside diameter of the pipe and then brazed to the culvert itself. This sleeve could be made out of sheet steel.

If the separation is not complete and the joints have merely opened up, the repair should be made by calking lead wool in the opening at the bottom of the joint.

Heating Coach Watering Hydrants

What are the advantages and disadvantages of heating coach-watering hydrants electrically to keep them from freezing? How can it be done effectively? Explain.

Experiment In Progress

By Plumber

Frozen coach-watering hydrants and the consequent job of thawing them out have been one of the banes of my winter existence. Because of sad past experiences in this connection I was strongly in favor of the first plan ever devised to install electrically heated hydrants at one of my trouble spots.

This plan was introduced, more or less experimentally, as a part of a platform renewal project at our coach yard. It was designed, so I am told, to accomplish two things, both of which met with my approval: (1) Conform to health department requirements, and (2) let me get more sleep because it would not freeze.

The first accomplishment was obtained by making the hydrant of the pollution-proof, post type. The second accomplishment was not fully realized at first in spite of careful planning in the design of the hydrant itself.

As first placed, the entire hydrant was wrapped with several coils of an electric heating unit, of the cable variety, I believe, and both were enclosed in a pipe casing. This pipe casing was then filled with rock-wool insulation. From the time of my first glance at the plans for those hydrants until the very cold weather of the following winter, I was sure I

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wouldn't have any calls to thaw them out. I was wrong.

Our first trouble was caused before freezing weather by material-handling trucks bumping into the posts and damaging them. Our next trouble came in the first bad freeze. Some of the hydrants froze up with the current turned on. Investigation proved that the rock-wool insulation had sifted between the heating coils and the water pipe and insulated the hydrant from the heat generated by the coils. So, the insulation was removed and the hydrants functioned almost as effectively as first intended—until the first heavy thaw.

At that time, snow and ice melted from cars and in the tracks and drained, in some cases, into cable conduits, thereby "shorting" the electrical connections to the heating elements. After the trouble was found, following a tedious search, the necessary repairs were made and no further failures occurred.

I think we now have most of the "bugs" out of this experimental installation, but we have not had enough experience with it to say definitely whether we can justify another similar installation should the occasion arise.

Standardizing Trestle Bridges

In the renewal or replacement of trestle bridges, to what extent is it practicable for a railroad to standardize on steel, concrete or timber structures? How do year-to-year changes in the relative prices of these materials affect such standardization?

Consider Future Maintenance

By C. E. Sloan
Engineer of Bridges, Baltimore & Ohio, Baltimore, Md.

In the renewal or replacement of old, open-deck timber trestles, consideration should generally be given to making a fill over one or more lines of pipe, if the opening required permits such treatment. This type of replacement is particularly advantageous where a filling material is available such as slag, which can usually be dumped at reasonable cost from drop-bottom cars standing on the old trestle. The old stringer chords and the deck timber can then be removed. A rather permanent and, certainly, a fireproof structure can often be provided in this manner at very little increase in cost over renewal in kind, and with a very great decrease in future maintenance costs.

Where the approximate opening provided by the old trestle must be maintained, renewal in treated timber in accordance with standard plans for either frame or pile trestle, open or ballasted deck, can be readily made. Such standards, based generally on plans published in the A.R.E.A. Manual and prepared by Committee 7, but modified to suit the road's own ideas or needs, should be available to its maintenance department. The old trestle to be replaced may be of sub-standard design, having long panels or spacing between bents, poor bearing under frame bents, untreated parts or other deficiencies, which would be corrected when renewed in accordance with such a standard plan.

Again, in emergencies involving a steel or concrete structure damaged by flood or derailment, a standard timber trestle is often the quickest way of restoring traffic. Materials are usually available from stocks of timber or piling, and can be placed by the carpenter gang of the affected division.

Where long, "overflow", mainline timber trestles, having a moderate height above ground line, have been replaced, the new structure has, in many instances, on this road, taken the form of a standard concrete trestle. In this type of structure a somewhat better waterway is provided because the bent spacing is about 18 ft. as compared to 12 ft. more or less, for the timber trestle. However, the depth of ballast and slab on the new trestle is about 16 in. more than the depth of tie and timber stringers. This difference must be taken into account in providing for the waterway. Several thousand lineal feet of such replacements have been made, but only one instance is recalled in which the plans were varied somewhat from the standard. In that case it proved to be economical to vary the bent spacing and slab lengths so as to fit the new pile bents in between the old pedestals. Replacement of open-deck timber trestles with ballast deck reinforced-concrete trestles has gener-

(Continued on page 942)


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What's the Answer? (Cont'd)

ally been done on the same alinement to which the old trestle was built.

A smaller, but still large, track footage of ballast-deck timber trestles has been replaced on this road by standard-plan, reinforced-concrete trestles. These replacements have generally been made on new alinement, as close as possible to the old trestle. This change of alinement results from the difficulty of driving piles because of the old ballast deck, and resulting interference with traffic. These old, treated-timber, ballast-deck trestles had service-lives of about 30 years. Renewal was necessary because of the deterioration of the piling at the ground line and cut-off, and of the stringers at the bearing points.

Live-load stresses recently measured in the reinforcing of concrete slabs have been found surprisingly low—much less than the calculated stresses. Also, reinforced concrete piles and slabs are now usually cast under "factory" conditions. Therefore, it appears that a very satisfactory length of service life can be anticipated for concrete trestles built to standard plans, developed along lines recommended by the A.R.E.A. Masonry committee.

The interest, now very general, in prestressed concrete may result in the design of a much lighter slab than the present standard, with resulting economies in materials and the cost of field erection. It is understood that the A.R.E.A. Masonry committee is doing some experimental work on prestressed concrete for railway bridges.

Where the old trestle to be replaced is quite high, a steel or masonry structure may be indicated. In such cases a special design will usually be desirable. Since beam spans up to 50 ft. are available, and since these, with two-ply stringers, can be supported on much thinner piers than generally used for the support of girder spans, this type of structure is very frequently used on this railroad in trestle replacements. In this type, small bank abutments supported on piling are used. Standard details can be used for most parts of such structures, although the height of piers and the length of spans will, of course, vary. A steel viaduct replacement must be designed to fit local conditions.

There will also be other cases calling for the development of a special design. In the recent replacement of a ballast-deck, timber trestle over a tidal stream having a deep sedimentary bottom, comparative designs led to the selection of five, 80-ft. deck-girder spans as the most economical.

Yearly fluctuations in the price of building materials will have an influence on the type of structure selected. This influence, however, may be less than that of the ability to readily obtain critical materials, such as steel at the present time. An important factor, which must be taken into account, is the expense of future maintenance of the type of structure selected. This expense will probably be minimum if culvert and fill are selected for trestle replacement. Also a reinforced-concrete structure would have an advantage in this respect over a steel structure, since painting would be unnecessary. Further. the advantage resulting from a fireproof structure, such as a pipe culvert and fill, or a reinforced concrete trestle, when compared to an open-deck, timber trestle or steel bridge, should not be overlooked.

Don't Standardize Now

By G. L. Staley
Bridge Engineer, Missouri-Kansas-Texas, St. Louis, Mo.

In replacing timber trestles with more permanent structures, it is well to compare the cost of several types of structures before selecting the particular type to use. During recent years, steel beams have sometimes been cheaper than incised and creoesoted wood stringers which, although considered by some as not permanent material, will likely be more permanent than the railroad itself, and would make an adequate structure.

In a great many instances, creosoted pile bents outlast by many years all the material above the pile. Sometimes they last twice as long. In such cases, steel caps and stringers used on wood bents produce a bridge that, for all practical purposes, is permanent and costs less than one having steel or concrete piles. Thus, by using the wood piles, a bridge is built in which all the material may be expected to wear out about the same time.

(Continued on page 944)

What's the Answer? (Cont'd)

An inflexible practice of using only one kind of bridge where permanent construction is attempted, does not seem proper at this time. Several types, such as concrete culverts and trestles, metal pipes, combinations of wood and steel, concrete and steel, or all steel, should be considered, both as to time and location, when preparing bridge programs. The availability of materials must also be considered, and comprehensive costs must be determined somehow. A correct picture of the evolution and future trend of the transportation industry might also be used to advantage, if not over done.

How to Insulate Metal Buildings

When prefabricated metal buildings are used that are to be heated, what is the best method of insulating them taking into consideration fire resistance and first cost? Explain.

A Three-Sided Problem

By E. T. Cross
Vice-President, Armco Drainage & Metal Products, Inc., Middletown, Ohio

The only reason for insulating any building, of metal or other material, is to keep it warmer during cold weather and/or cooler in hot weather. On this basis three things must be decided about any building insulating job: (1) How much insulation to use; (2) what kind of insulating material to use; and (3) how shall the insulant be applied?

The amount of insulation needed is a matter of economics. Increasing the quantity up to a point, saves fuel or cooling costs. Interestingly enough, none of the standard building materials, metal or otherwise, have enough insulating value to be economical in many uses or locations, without being supplemented.

Almost without exception, more insulation should be used in ceilings than in sidewalls. In a typical building, about 50 per cent of the heat loss is through the ceiling and about 25 per cent through sidewalls and the balance through and around windows, doors, etc.

Under average conditions and uses, two to four inches of insulation in the ceilings and ¾ in. to 1 in. for sidewalls is satisfactory from the standpoint of economy and comfort.

The choice of insulation is dependent upon the usage and the type of building. Board-type insulation on sidewalls has a threefold purpose—it provides a finished wall, acts as insulation, and has soundproofing properties. However, if the wall surface is likely to receive rough usage, it might be advantageous to apply a batt-type insulant, over which metal, plywood or similar rugged surfaces can be fastened.

The type of insulation may also depend on the kind of metal building. In metal buildings, with columns, beams, knee braces, girts and other framing members, furring might become excessively expensive. In such cases it sometimes becomes necessary to use a spray-on type of insulation. Spray-on types, generally speaking, are not as efficient for a given thickness of material as more porous types. They do have the advantage, however, of easier application over irregular or rough surfaces.

Board or batt-type insulants can be installed quite readily over furring strips. Some prefabricated steel buildings are such that 1-in. by 3-in. wood furring strips can easily be used. The nature of the ceiling or roof construction will effect the choice of ceiling insulants in much the same manner that it will effect that for sidewalls.

The methods of applying insulants have been discussed, to some extent, in the preceding section. However, there are certain precautions to be taken in applying any of these materials. Most insulating materials permit moisture in the air to travel freely from the warm interior of the building, through the insulation, toward the cold exterior metal. When this happens, sweating of the metal is apt to occur. In a properly engineered metal building, the sweating does not necessarily cause any harm, but does have to be taken into account. The preferred way is to use a vapor barrier (a material that will not let moisture go through it) at or near the inside wall surface.

Good ventilation will go a long way toward minimizing the prob-

(Continued on page 946)

What's the Answer? (Cont'd)

lem of sweating. A combination of vapor seal and adequate ventilation works well. The amount of ventilation depends on the use of the building. For instance, a laundry, kitchen, shower room, etc., presents the worst moisture condition, for which extreme care must be taken to get a good vapor seal and to ventilate the structure adequately. In uses such as carpenter shops, etc., the matter of sweating is not apt to be particularly troublesome unless temperatures are very low or atmospheric humidity very high.

All of the research work done in recent years by insulation experts, points to the fact that a combination of vapor seal and ventilation are important in every type of construction.

Users Have "Pet" Methods

BY M. LUFT

Assistant Sales Manager, Great Lakes Steel Corporation, Stran-Steel Division, Ecorse, Detroit, Mich.

The preferred method of insulating prefabricated metal buildings, considering fire resistance and first cost, is not necessarily the same for all types of metal buildings or for all building occupancies.

Our experience with insulated Quonset metal buildings is that we have yet to contact an owner who is not satisfied with the insulation qualities of his particularly building regardless of the type of insulant used or the method of applying it.

The following three examples are typical of the various ways in which our buildings have been insulated. Each owner thinks his is best for his group of conditions. Any of them could be duplicated just as effectively in railroad use.

(1) The owner of a 60,000 sq. ft. multiple-type building in Chicago insulated his building with a fiberglass blanket supported by an interior finish of corrugated aluminum sheets. The glass blanket was located between the exterior corrugated galvanized steel sheets and the interior finish of corrugated aluminum sheets. Both the fiberglass blanket and aluminum interior finish were installed after the exterior sheets had been applied. The interior finish of the aluminum sheets was nailed directly to the

inner flanges of the building ribs with the corrugations of the aluminum at right angles to the ribs. By adopting this method of applying noncombustible insulation and interior finish instead of combustible materials the owner of this plant has realized enough savings in fire-insurance premiums during a 7½-year period to pay the entire cost of the insulation.

(2) The owner of a 40,000 sq. ft. building in Rockton, Ill., insulated his building with reflective aluminum foil. The foil acted also as the interior finish. Wood furring strips were nailed directly to the nailable inner flanges of the building ribs, and the reflective-foil insulation was fastened to the furring strips.

In this instance the owner adopted the reflective method of insulating his building because of a previous satisfactory experience with an identically insulated building. Equally important was his desire to obtain the best lighting conditions for workmen in the building, which he claimed to obtain from the reflective surfaces of the walls and ceiling.

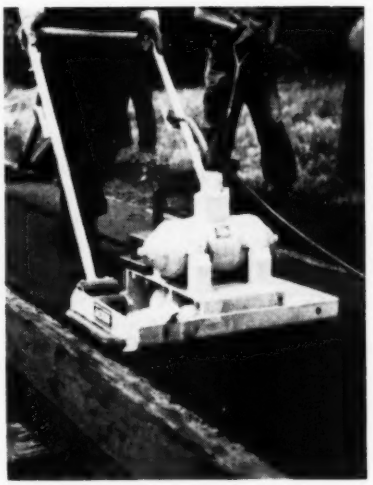
(3) A dealer handling our buildings in Wisconsin has standardized on one single method of insulating all the buildings he sells. He claims that his method gives an owner excellent insulation for the least cost—because of the economy in applying the insulation. He uses exclusively an insulated board, 25/32 in. thick, which also becomes the interior finish. This board is installed between the exterior corrugated steel sheets and the structural steel rib and purlin framework of the building after the framework has been erected and at the same time the exterior sheets are applied. By installing the insulation in conjunction with the exterior sheets, all nails, glues, bolts, fastenings, furring strips or special scaffolding for the usual insulation installation are eliminated. To do this an insulation board the same size as an exterior sheet is positioned just before an exterior sheet is applied. Nailing the exterior sheets to the framework automatically fastens the insulation, thereby obtaining maximum efficiency of materials and labor. One or two coats of asphaltic-base paint colored with aluminum flakes is applied over the interior surface as a vapor barrier for those occupancies having high humidity conditions.

NEW PRODUCTS

(Continued from page 933)

ers is said to add greatly to the machine's speed and efficiency without crushing the ballast.

This tamper is equipped with set-off wheels and air-operated jacks. It is propelled by an air motor through a three-speed transmission powered by a 315 cu. ft. diesel compressor. It will travel at speeds from 6 to 30 m.p.h.



PORTABLE COMPACTOR

AN improved Jackson Vibratory Compactor, presently being placed on the market, is said by its manufacturer, Jackson Vibrators, Inc., Ludington, Mich., to be the ideal machine under many circumstances for the compaction of asphalt, granular soils and water-bound macadam bases. Electrically operated, the machine propels itself at a rate of approximately 25 ft. per min., delivers up to 4500—1¾-ton blows per minute, and will compact an area of 900 to 1200 sq. ft. per hr. Having, as it does, a smooth base, the machine is said to be advantageous for the compaction of asphalt mixes (either hot or cold) and for the construction of driveways, station platforms, railroad-highway crossings and the like. Theoretical optimum densities of the material used are said to be closely approached. Subbases and base courses of crushed materials are also readily consolidated with this machine, using the smooth base. It is claimed that water-bound macadam can be com-

pacted to maximum density in two passes of the machine.

Other uses for the Jackson Vibratory Compactor, according to the manufacturer, include the compaction of granular soils in subbases for factory floors, in trenches, at bridge approaches or wherever it is necessary to secure maximum density of such materials quickly. The compactor handles most granular materials in 12-in. lifts, and maximum density is said to be usually attained in two passes. For best results in the latter uses a corrugated base is quickly substituted for the smooth base.

The compactor is said to be rugged and reliable, having only one moving part—the shaft of the heavy-duty vibratory motor. For quick manueverability where frequent changes of location are necessary, such as are required in pavement patching, a complete auto-trailer unit is provided, on which is mounted a 2.5-Kva. (2500-watt) Jackson power plant and an hydraulic jack for picking up and lowering the compactor. The power plant generates both single-phase and 3-phase, 110-volt, 60-cycle alternating current and may be used to operate other power tools and lights as well as for operating the compactor.

NEW COMPOUND FOR PATCHING FLOORS

THE Hallemite Manufacturing Company, Cleveland, Ohio, has developed a new floor-patching compound, called Por-Rok, which is reported to set hard so quickly after application that permanent repairs to chuck holes or cracks in concrete floors can be made during working hours. In other words, with this material it is unnecessary to wait until the floor is out of service over week ends or holidays to do the work. According to the company, Por-Rok is ready for light loads in 15 min. after application, normal loads in 30 min., and the heaviest loads in one hour.

Application of the material is simple. After the hole or break in the floor has been cleaned, the compound is first mixed with water and the mixture is then poured into the opening. It is claimed that the material is self-bonding, will not shrink, and requires no troweling, and that it will develop a compressive strength of 4500 p.s.i.

THE MONTH'S NEWS

Railway Personnel

General

R. W. Cassidy, supervisor bridges and buildings on the Chesapeake & Ohio, at Peru, Ind., has been appointed to the newly created position of assistant allotment commissioner, reporting to the chief rating commissioner, at Huntington, W. Va.

Engineering

Charles H. Blackman, chief engineer of the Louisville & Nashville, with headquarters at Louisville, Ky., has retired after more than 50 years of continuous service. His successor is **L. L. Adams,** assistant chief engineer, who is in turn succeeded by **Howard C. Forman,** special engineer at Louisville. Advancing to succeed Mr. Forman is **Walter E. Quinn,** assistant engineer in charge of the chief engineer's miscellaneous department. **F. H. Boulton,** division engineer on the Cincinnati division, becomes assistant engineer in charge of the miscellaneous department, and is succeeded by **R. B. Lindsey,** assistant engineer in

Charles H. Blackman

L. L. Adams

For additional information, use postcard, pages 871-872

Howard C. Forman

Walter E. Quinn

F. H. Boulton

the chief engineer's office. **James B. Bolling,** assistant division engineer on the Louisville division, becomes assistant engineer in the miscellaneous department, while **John Leinard,** assistant engineer in the special engineer's force at Louisville, moves to the Louisville division as his successor.

A native of Nashville, Tenn., Mr. Blackman studied civil engineering at Vanderbilt University and while attending school worked as chainman and rodman on preliminary and location surveys for the Tennessee Central. Be-

(Continued on page 952)

ginning his career with the L.&N. in May 1901 as a rodman on the Louisville division, he subsequently moved up through the ranks, serving successively as assistant engineer, resident engineer on construction, assistant engineer in charge of the miscellaneous department and principal assistant engineer. He was promoted to chief engineer in July 1941.

Mr. Adams, who is a graduate of the University of Kentucky, served 11 months overseas during World War I and attained the rank of captain. He joined the L.&N. in May 1911 as a rodman in the construction of DeCoursey yards, and later served in various other positions, including resident engineer, assistant engineer and roadmaster. Promoted to division engineer in 1931, he was advanced to engineer maintenance of way in 1936, and further elevated to assistant chief engineer in October 1943.

Born at Williamstown, Ky., Mr. Forman graduated from the University of Kentucky, went with the L. & N. in October 1920 as an instrumentman on the Eastern Kentucky division, and later served as draftsman, assistant engineer and division engineer. He became assistant engineer in charge of the chief engineer's miscellaneous department in June 1944. In May 1945 he was advanced to the newly-created position of special engineer.

A native of Sturgis, Ky., Mr. Quinn, studied civil and mining engineering at the University of Kentucky, and joined the L. & N. as a rodman on the Eastern Kentucky division on August 16, 1923. Later he served successively as instrumentman and assistant engineer on that division and in the miscellaneous department at Louisville, and as assistant division engineer on the Birmingham division. He was appointed assistant engineer in charge of the miscellaneous department at Louisville on May 1, 1945.

Mr. Boulton is a graduate of the University of New Hampshire. He was first employed by the L. & N. as a draftsman in the chief engineer's office at Louisville on November 8, 1937. After serving in various other capacities on the Birmingham, the Cumberland Valley, the Knoxville, the Atlanta and the Louisville divisions, Mr. Boulton became assistant engineer in the chief engineer's office on December 16, 1946, and, soon thereafter, assistant supervisor of bridges and buildings on the Louisville division. He was promoted to assistant division engineer on May 1, 1947, and to division engineer on the Cincinnati division on January 1, 1951.

Mr. Lindsey, a graduate of the University of Tennessee, became associated with the L. & N. as a junior instrumentman on January 22, 1940. He later worked as assistant engineer on various divisions, as draftsman in the chief engineer's office, as resident engineer on the rebuilding of the West Pascagoula (Miss.) bridge, and as assistant division engineer on the Louisville division. He was appointed assistant engineer in the chief engineer's office on October 8, 1948.

L. V. Johnson, whose promotion to chief engineer of the Minneapolis, St. Paul & Sault Ste. Marie was announced

L. V. Johnson

in the September issue, is an alumnus of the University of Minnesota, from which he was graduated in 1927 with a Bachelor of Science degree in civil engineering. He started his railroad career with the Great Northern as a

draftsman in 1927, later served with the N. P. for a short time before accepting a position with the Soo Line as a draftsman in April 1928, and progressed through the ranks in the engineering department to become maintenance engineer in 1940. He was granted a leave of absence from the railroad during World War II to serve in the army as lieutenant colonel, returning to his former post in 1946. Mr. Johnson was appointed district engineer on the Chicago division in 1948, in which position he served until his promotion to chief engineer.

B. V. Bodie, whose promotion to chief engineer of the Gulf, Mobile & Ohio at Mobile, Ala., was announced in the September issue, was born at Pittsburgh,

B. V. Bodie

Pa., January 13, 1910, and obtained his higher education at the Baltimore Polytechnic Institute and Johns Hopkins University. He entered railroad service with the Alton (now G. M. & O.) as a rodman and instrumentman on the staff of the division engineer, Eastern division, at Bloomington, Ill., in August 1935, later serving in the same capacities in the chief engineer's office at Chicago. Entering the operating department as assistant trainmaster in August 1940, Mr. Bodie was subsequently promoted to trainmaster in January 1942, and to superintendent in December 1943, which position he held at the time of his advancement to chief engineer.

R. A. Emerson, assistant chief engineer of the Canadian Pacific, has been promoted to chief engineer, with headquarters as before at Montreal, Que., succeeding **John E. Armstrong,** who has retired.

L. E. Rundell, roadmaster on the Oklahoma division of the Atchison, Topeka & Santa Fe, has been promoted to division engineer of the Illinois division, with headquarters at Chillicothe, Mo. He is succeeded by **Francis L. Rees.**

Walter E. Fuhr, division engineer on the Chicago, Milwaukee, St. Paul & Pacific at Miles City, Mont., has been transferred to Savanna, Ill., succeeding **Martin L. Bardill.** Mr. Bardill moves to Terre Haute, Ind., where he replaces **Roger W. Middleton,** who, in turn, succeeds Mr. Fuhr.

E. D. Billmeyer, assistant division engineer on the Western Maryland, has been promoted to division engineer, with headquarters as before at Cumberland, Md., succeeding **W. B. Lee,** who has been transferred to Hagerstown, Md., to succeed **G. H. Hornbaker,** who has retired after 38 years of service.

Roscoe Perkins, Jr., has been appointed assistant engineer, and **Howard M. Emery,** engineer in charge, both in the office of chief engineer, Eastern region, of the Pennsylvania, with headquarters at Philadelphia, Pa. **Walter A. Kautz, Jr.,** has been appointed engineer in charge at Baltimore, Md.

C. S. Kirkpatrick, chief engineer of the Missouri Pacific Lines in Texas and Louisiana, with headquarters at Houston, Tex., retired on September 1, after more than 38 years of service. His former duties have been taken over by **F. S. Schwinn,** assistant chief engineer at Houston. The position of chief engineer has been abolished.

Charles Kuchel, assistant engineer on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Chicago, retired on October 1.

Railway Personnel (Cont'd)

G. A. Darby, assistant engineer on the Minneapolis, St. Paul & Sault Ste. Marie, at Minneapolis, Minn., retired recently.

Track

G. A. Fox, assistant roadmaster on the Chicago & Northwestern at Milwaukee, Wis., has been promoted to roadmaster at Valentine, Neb., succeeding **W. D. Reed,** who has resigned.

H. D. Angell, track supervisor on the Chicago, Burlington & Quincy at Prairie Du Chien, Wis., has been promoted to roadmaster at North La Crosse, Wis., succeeding **L. P. Carlson,** whose death was reported in the September issue.

G. O. Harmon, section foreman on the Chicago, Rock Island & Pacific at Atlantic, Iowa, has been promoted to roadmaster, with headquarters at Clay Center, Kan., succeeding **F. E. Long,** who has been transferred to Peoria, Ill. Mr. Long replaces **J. B. Skidmore,** who has been transferred to LaSalle, Ill., where he succeeds **J. H. Burns,** who has been assigned to other duties. **W. D. Norris,** roadmaster at Liberal, Kan., has been transferred to Pratt, Kan., succeeding **H. W. Deakin,** who, in turn, succeeds Mr. Norris at Liberal. **Lee Dunn** has been appointed acting roadmaster at El Reno, Okla., succeeding **C. J. Overholser,** who has been granted a leave of absence because of illness.

Ole Hoel, roadmaster on the Minneapolis, St. Paul & Sault Ste. Marie, at Chippewa Falls, Wis., has been promoted to assistant general roadmaster, with headquarters at Stevens Point, Wis.

Special

William T. Wellman, consulting architect for the Union Pacific at Omaha, Neb., retired from active duty on August 31. Mr. Wellman first joined the U.P. at Omaha 33 years ago as a draftsman. He remained in that city throughout his entire career, moving through the positions of architectural draftsman, architect, bridge and structural draftsman and designer to that of general architect in 1941. He was the architect for such notable structures as the Omaha Union Station, Grand Canyon Lodge, the resort at Sun Valley, Ida., and the facilities of the road in the southern Utah national parks.

Obituary

William J. Shaw, retired division engineer on the Michigan Central (New York Central System), died recently.

Leonard Schultze, 73, architect who designed and supervised construction of the Grand Central Terminal in New York, died on August 25 at White Plains Hospital, White Plains, N. Y.

Association News

Metropolitan Maintenance of Way Club

The opening event of the fall session will be a dinner meeting at the Hotel Sherburne, New York, on October 25, to begin at 6:30 p.m. H. H. Talboys, vice-president in charge of the Railway Equipment Division of Nordberg Manufacturing Company, will give a talk, following which a short film, entitled "Troop Train," showing how today's army moves an armored division, will be shown.

Bridge and Building Association

The association held its annual meeting in Chicago September 17-19, concurrently with the annual convention of the Roadmasters' and Maintenance of Way Association. Joint features of the two programs are reported in the Roadmasters' section of this issue. Detailed reference to the separate features of the Bridge and Building program, including the printing of the committee reports in full, and abstracts of the discussions which followed their presentation, will be published in the November issue.

American Railway Engineering Association

At the time of going to press, two technical committees had scheduled meetings for this month. They are the Committee on Iron and Steel Structures, which will meet at the Brown hotel, Louisville, Ky., October 16-17, and the Committee on Waterproofing, which will meet at Purdue university, Lafayette, Ind., October 15-16. In addition, the Committee on Ties has tentatively scheduled a meeting to be held on October 30-31 and November 1, at Spartanburg, S. C., and Charleston, where the treating plants of the Taylor-Colquitt Co., and Koppers Co., Inc., will be visited, and the crossties of a number of roads observed.

National Railway Appliances Association

Applications for space at the exhibition to be held by the National Railway Appliances Association at the Coliseum,

Meetings and Conventions

American Railway Bridge and Building Association—Elise LaChance, Secretary, 431 S. Dearborn Street, Chicago 5.

American Railway Engineering Association—Annual Meeting, March 11-13, 1952, Chicago. Neal D. Howard, Secretary, 59 E. Van Buren Street, Chicago 5.

American Wood-Preservers' Association—H. L. Dawson, Secretary-treasurer, 839 Seventeenth Street, N. W., Washington 6, D. C.

Bridge and Building Supply Men's Association—L. R. Gurley, Secretary, 201 North Wells street, Chicago 6.

Maintenance of Way Club of Chicago—Next meeting October 22. E. C. Patterson, Secretary-treasurer, Room 1512, 400 W. Madison street, Chicago 6.

Metropolitan Maintenance of Way Club—Secretary, 30 Church street, New York.

National Railway Appliance Association—Robert A. Carr, Secretary, 310 South Michigan avenue, Chicago 4; Lewis Thomas, Assistant Secretary, 59 East Van Buren street, Chicago 5.

Railway Tie Association—Roy M. Edmonds, Secretary-treasurer, 912 Shell Building, St. Louis 3, Mo.

Roadmasters' and Maintenance of Way Association of America—Elise LaChance, Secretary, 431 S. Dearborn street, Chicago 5.

Track Supply Association—Lewis Thomas, Secretary, 59 E. Van Buren street, Chicago 5.

Association News (Cont'd)

Chicago, March 10-13, 1952, were mailed to interested manufacturers the latter part of September. The exhibition will be held concurrently with the annual convention of the American Railway Engineering Association. Because this will be the only exhibition until September 1953 of materials and equipment used in the construction and maintenance of railway properties, coupled with the fact that a number of firms have requested admission to membership in the association, indications are that the demand for display booths will utilize all available space in the Coliseum. Requests for information regarding the exhibition should be sent to Lewis Thomas, Director of Exhibits, National Railway Appliances Association, 59 E. Van Buren St., Chicago 5.

Maintenance of Way Club of Chicago

The first fall meeting of the club will be held on October 22 at the same location where the meetings have been held for several years, namely, at Eitel's restaurant in the Field Building, Clark and Adams streets, Chicago. At the time of going to press the character of the program for this meeting had not been announced.

Supply Trade News

General

The Spring Packing Corporation, Chicago, has been appointed the exclusive national distributor for the railway products of Dednox, Inc., Chicago.

Branson Instruments, Inc., has moved to a new plant at 439 Fairfield avenue, Stamford, Conn.

The Peerless Equipment Company, 332 South Michigan avenue, Chicago, has been appointed the exclusive railroad supply agent of the **American Hoist & Derrick Co.,** St. Paul, Minn. Peerless will handle American Hoist business with practically all railroads that headquarter in the Chicago area.

Personal

Bowser, Inc., 33 North LaSalle street, Chicago, has acquired ownership of the **National Scientific Laboratories, Inc.,** 2010 Massachusetts avenue, N. W., Washington, D. C. **Robert I. Sarbacher,** president of National, has been appointed also director of research for Bowser, and will head the product development work of all subsidiary companies.

Sigurd A. Rishord, sales manager of the **Northwestern Motor Company,** has been elected vice-president, with headquarters at Eau Claire, Wis.

Duane L. Kenaga has joined the staff of the wood-preservation laboratory of the **Dow Chemical Company,** Midland, Mich.

The **Robert W. Hunt Company,** engineers, have announced that **W. H. Bolger** has been advanced to manager of laboratories, and **Cromwell Bowen** to assistant manager of laboratories.

H. L. Holderman has been appointed sales representative of **Bird & Son, Inc.,** with headquarters at Chicago. For the past seven years Mr. Holderman has been supervisor of wood preservation on the Chicago & North Western, and in charge of the road's treating plant at Escanaba, Mich. Before then he had served as division engineer and assistant general bridge inspector.

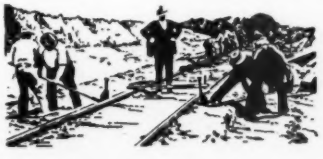
W. G. Scholl, general sales manager, Tractor division, **Allis-Chalmers Manufacturing Company,** Milwaukee, Wis., has been appointed vice-president in charge of sales of that division. **C. W. Schweers,** director of sales, general machinery division, was named vice-president in charge of sales for the general machinery division. **J. F. Roberts,** director of engineering, general machinery division, was named vice-president in charge of engineering of the same division and **W. A. Yost,** manager, mechanical power department, was named a vice-president of the general machinery division. **G. F. Langenhol,** assistant treasurer, was elected treasurer and also appointed assistant secretary. **N. D. Johnson,** assistant secretary, will continue to serve in that capacity and will assume additional responsibilities as assistant treasurer. **E. J. Dietrich,** assistant to the comptroller and **T. D. Lyons,** works comptroller were appointed assistant comptrollers.

John F. Spauling, manager of the Buffalo (N. Y.) branch of the **Black & Decker Manufacturing Co.,** Towson, Md., has been appointed sales manager, succeeding **Glen H. Treslar** who has been promoted to vice-president in charge of sales.

Obituary

David J. Jones, executive sales representative of the Vapor Heating Corporation, Chicago, died in that city on August 14, after a long illness.

John P. Roberts, assistant general manager of the Timken Roller Bearing Company, Service Sales Division was killed in an automobile accident near Spruce Pine, N. C., on September 19.



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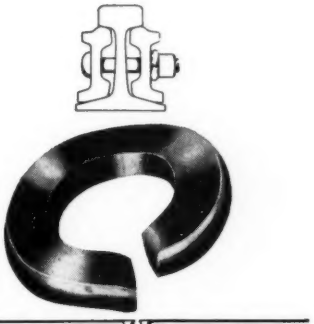

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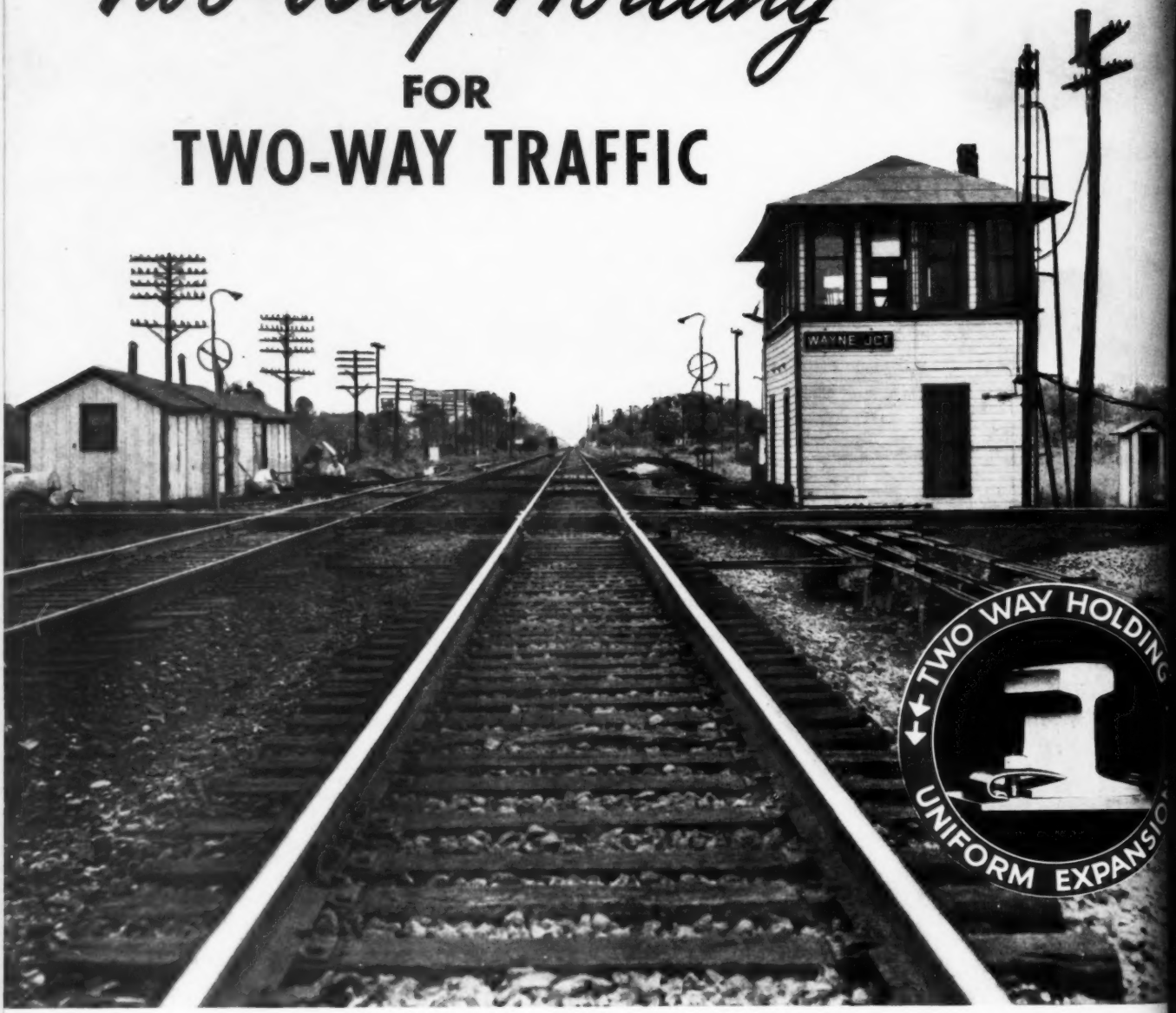

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